Commodore HORIZONS

The independent Commodore magazine

75p May 1984

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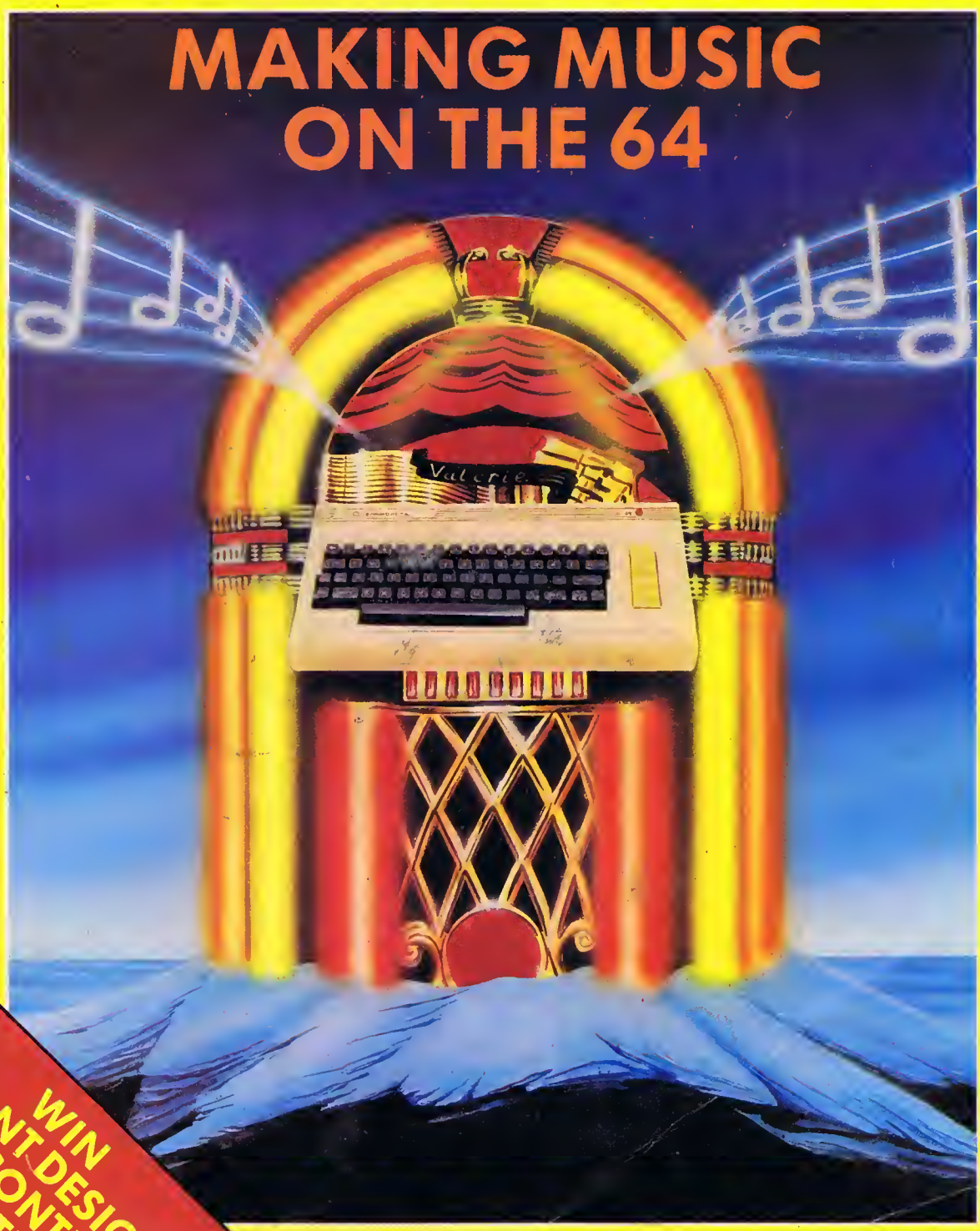

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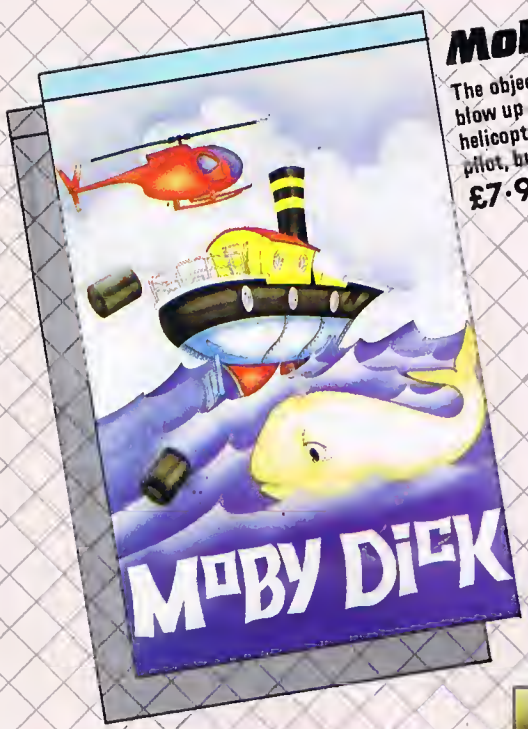

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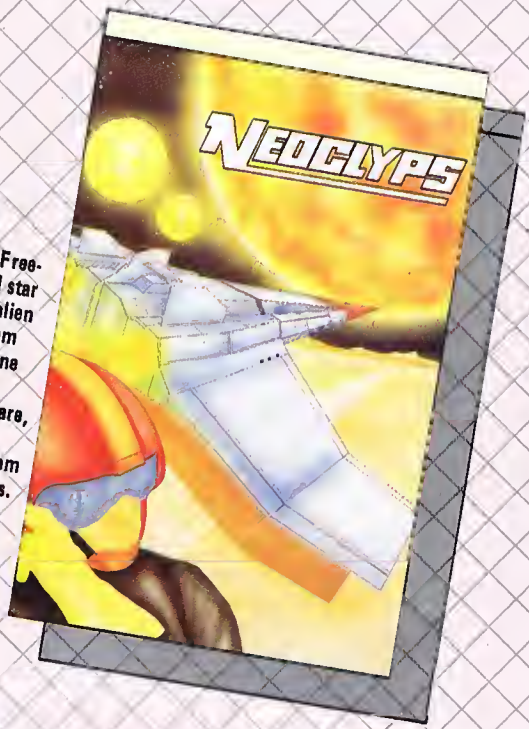

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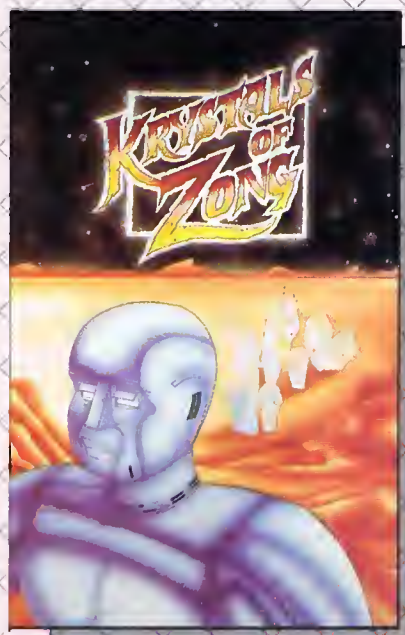

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The independent Commodore magazine

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EDITORIAL

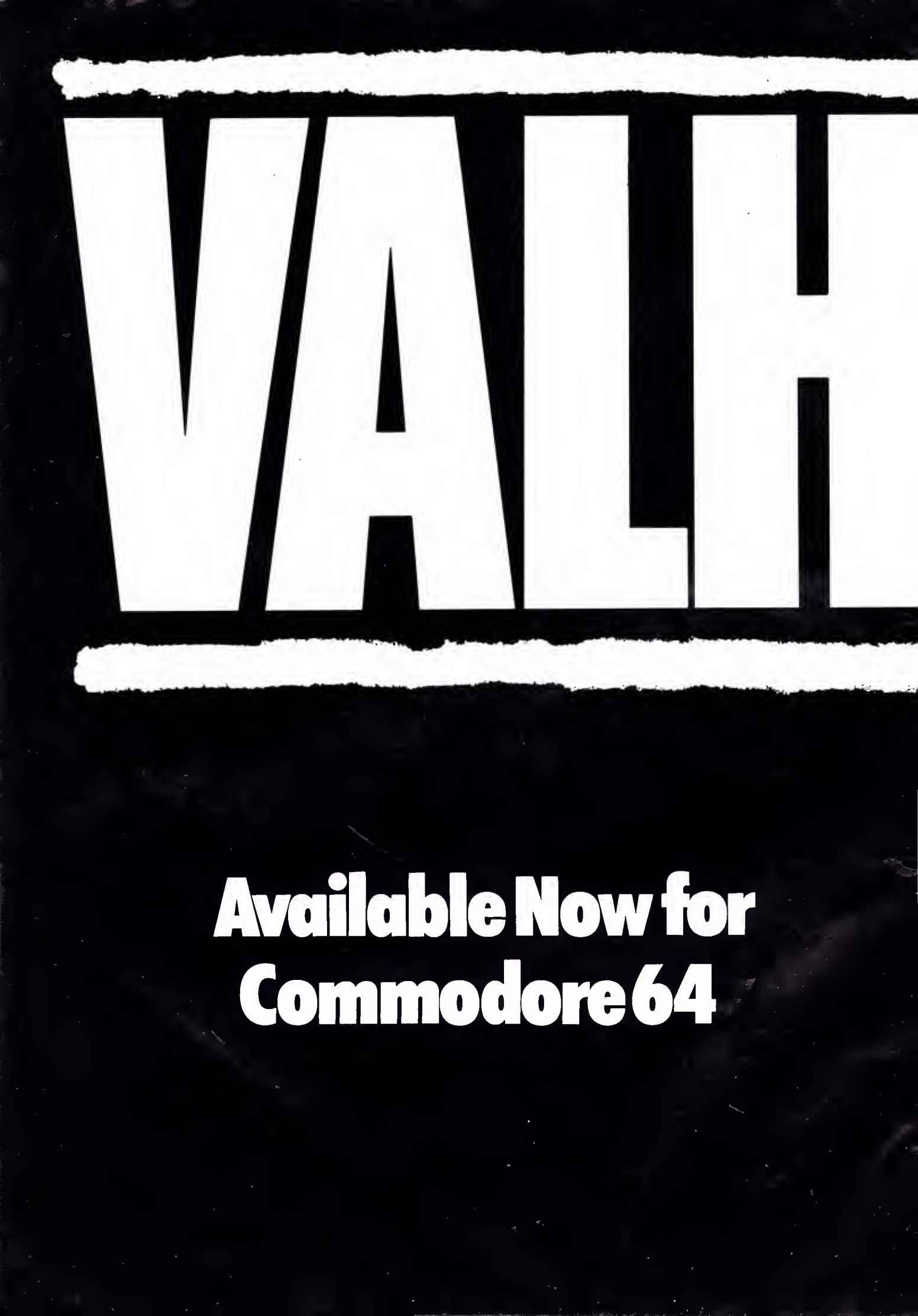
ONE OF THE few known jokes about computer giant IBM concerns its initials. Take a step back in the alphabet for each one and you get HAL, the name of the computer which rose to fame in the film "2001 — A Space Odyssey". For the rest it's pretty much a story of grey suited men in white shirts with massive marketing clout — so imaginative that at first they weren't even sure there was a market for computers.

But funny things keep happening on the way to the computer market. Just when IBM moves into the US home computer industry, Commodore decides to take a ride on some shirt tails the giant has left hanging out elsewhere. The name of this particular game is plug compatible manufacturing — if you can't beat IBM you join it by building compatible machines. And now Commodore too is plugging in, by signing a deal with the Canadian manufacturer of the IBM-compatible portable machine.

The idea of breaking with tradition seemed to appeal to Commodore. This announcement was followed by news of a semiconductor deal with Intel. Now Commodore has long prided itself on vertical integration, to use another piece of industry jargon. In this instance it means that Commodore makes its own chips, and so can't get burned by outside supply problems. But now it's going to start manufacturing an Intel chip — and surprise, surprise it's the Intel 8088 as used in the IBM PC and assorted look-alikes.

Sitting on this side of the Atlantic all this activity looks a bit breathless. A new range of micros (including the 264) is announced in Las Vegas, long time boss Jack Tramiel rides off into the sunset, senior executives resign, and suddenly the US papers are writing about the possibility of Commodore producing 16-bit IBM compatible machines. Meanwhile up in Northamptonshire, where all those Vics and 64s are meant to come from (you remember the Vics and 64s, don't you — they're the machines you can actually buy), the advance factory is swinging along, but the permanent plant is still being built.

It begins to sound like an army marching out of step. Or maybe it's just a case of the US vanguard being way ahead of the rear. And the ride's certainly getting rougher at the back. Dragon Data is launching a starter pack to rival the Vic's, the MSX-standard micros are beginning to arrive and Samurai/Elan/Flan is set to launch its machine under some name (or another). When that permanent factory does get to the front-line it's going to face a hard fight. And what of the vanguard? Are the trailblazers really going to try a pincer movement, launching 8-bit micros on the one hand and 16-bit IBM clones on the other? It certainly looks as though Commodore wants to have a range of weapons to choose from for the fray.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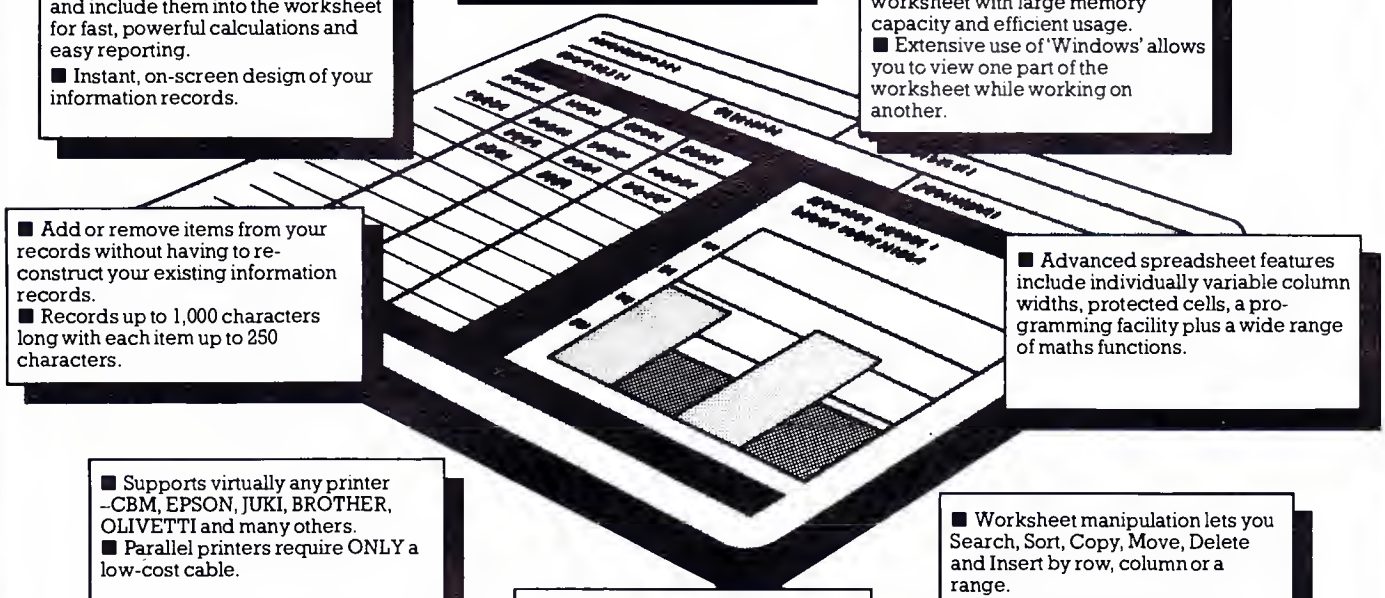

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LETTERS PAGE

China crisis

WE WERE sorry to read your poor review of China Miner (March edition). Your reviewer must be Billy Whizz with no ear for music, or he only likes very fast shoot-em-up games. True, the game might not be original, but there is no way it is written in Basic. Your reviewer was right about reaching for the volume control, though — we turned it up! The sound is by far the best we have ever heard on a 64.

We would recommend China Miner to anyone with a 64 — sorry Pete, we can't all be right!

Robert Ireland and
Andy Jones
Prestatyn
Clwyd

JUST TO SET the record straight, China Miner by Interceptor is written in machine code — Peter Gerrard's comment about Basic wasn't meant to be taken literally. Perhaps Pete's reactions are quicker than those of the average human being!

Altered states 2

WITH REFERENCE to the letter in April's Answer Back on converting a CBM 64 bought in England to work in the USA, I thought you might be interested to know how I converted my American 64 to work over here.

In the Programmer's Reference Guide you will find a section on the chip U31. This has an associated crystal, which I changed from the American NTSC standard to the British PAL standard.

Next find the chip U30, which is near the Vic chip under a metal screen. Find the marked jumper next to it and cut E2. Then connect E3 to E1. This acts as a voltage selector.

Lastly, replace the original Vic chip with one designed for use in this country, available from CBM. The composite video and audio signals can be routed through an external RF modulator for use with an American television.

Andrzej Nowobilski
Chiswick
London

Chart toppers

COMMODORE HORIZONS is fields ahead compared to other magazines, but you are sadly lacking in two areas.

Firstly, would it be possible to have a monthly chart for the best selling software for all Commodore computers?

Secondly, how about ratings for new software releases every month, based on the use of graphics, playability, value for money and so on, with all games being given a percentage rating?

Ben Arrowsmith
Macclesfield
Cheshire

WHAT DO other readers think of Ben's ideas?

Disk drive drawback

I HAVE recently bought a 64 and 1541 disk drive. However, as you are probably aware, of the small amount of software available about 95% is on cassette.

Assuming I can borrow a tape deck, is there a method of copying from cassette to disk — or would this be considered illegal and therefore protected against? If it can't be done, it certainly makes the disk, at least at the present, not nearly as useful as is implied.

Apart from this, the three programs I have so far located on disk were too near the £30 mark — I could buy a tape deck for not much more!

How about an article on disk-based databases, or even some explanations of the Programmer's Reference Guide — some of the chapters are pretty tough going!

Robert Davis
Bow
London

COPYING from tape to disk is illegal, and is usually protected against. This doesn't mean it can't be done — but despite the many enquiries we've had, we wouldn't be very popular with the software houses if we told you how to go about it!

Prime ham

DO YOU INTEND to publish any articles on the use of Commodore computers with the radio amateur in mind? As a licensed "Ham" I would dearly love to justify the expense of my 64 and disk drive as part of my hobby. I've attempted to write a few relevant progams, but CBM Basic is a little different to the Sinclair Basic I'm used to, and the language barrier still has to be conquered — but all in good time!

Morris Baldry
Sudbury
Suffolk

Sales patter

HAVING recently bought a 64 and C2N cassette unit, the most frustrating problem I had was that games cassettes refused to load.

Finally I met a very helpful salesman in the Microshop in Thetford, who explained that he sets up all the cassette units he sells using an oscilloscope, and can often rectify faults in this simple manner.

Lift the lid and you'll see a small crosshead screw next to the play head. Adjusting this changes the alignment of the head. A quarter turn in one direction or the other should enable you to load tapes normally. My husband found that the first adjustment he made put it right, and every tape has loaded perfectly since.

Lorraine Dorsey
Brandon
Suffolk

Repeat repeat

I WAS interested to see in the March issue Mark Slater's program to produce key repeats on the CBM 64.

I found that it would not run on my Vic 20, so I examined the structure of the machine language program in relation to the Vic memory map. This quickly revealed the structure of the program, which uses the IRQ hardware interrupt to repeatedly interpose the repeat program within any main program being run on the computer.

Those parts of the Vic and 64 memory maps concerned with the program seem identical. It seemed likely that the reason for the program not running on the Vic was a difference in keypress values. On the Vic, F1 has the value 39, whereas the program looks for a value of 4. F3 has the value 47, whereas the program looks for 5.

So on the Basic program I simply changed the value 4 in line 130 to 39, and the value 5 in line 140 to 47. The program then runs perfectly on the Vic!

Peter Noble
Stafford

Quality products

FIRST, THE compliments — you seem to have got it right. Plenty of up-to-date news, software reviews, and even the listings are readable.

I endorse your campaign to persuade more software houses to support Commodore machines, providing quantity does not replace quality.

I would rather buy a few original games that hold my interest, than lots of poor quality games that end up gathering dust on the shelf.

I would also like to see some articles devoted to war and strategy games like Eastern Front, for the Atari micro.

As for "Club Hell Nook", it keeps me laughing. A prize should be given, not for solving the competition, but for finding the bugs!

Finally, my wife would like to pass on the following tip to all those wives trying to get red-eyed, unshaven Vic 20 owners to bed; POKE 37155,255.

L A Crowe
Newport
Gwent

This is the chance to air your views — send your tips, complaints and compliments to Letters Page, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD

CLUBNET

Serious side of clubs

***Chris Jenkins** visits a North London group with an intellectual approach*

THERE ARE computer clubs which seem to exist purely to play games, and there are clubs which explore some of the more challenging areas of micro usage. The North London group is one of those which encourages the more intellectual approach — many of the members are professionals in the computer field, and whatever problem a member might have, there's probably an expert in the field available to help.

The Commodore group developed from the North London Computer Hobby Club, which has been around for about five years. Though there is still a hard core of Pet users, the group is turning more and more towards the 64.

The group uses the facilities of the Islington Community Computer Centre, which is financed by the local council and chamber of commerce. There are sub-groups for business users and the "soldering-iron brigade", and the Commodore Users' branch meets every second Tuesday.

Applications

Although the group is not an offshoot of the Independent Commodore Products Users Group (ICPUG), it's a fertile field for recruiting — our technical expert Jack Cohen is a member of the group, and also Membership Secretary of ICPUG.

Group organiser Barry Miles is a senior lecturer in the Department of Business Studies, and an occasional contributor to a range of computer magazines. He explained that although the group would do nothing to discourage enthusiasts whose main interest was in games playing, most members are interested in serious hardware and software applications.

Paul Jay, programmer of Commodore's Face Ache game and a forthcoming art program, is a member. Harry Broomhall, ace machine code programmer, is another. He's legendary in the group for his work on Hewlett-Packard programmable calculators — apparently he spent so much time on one machine that he wore out several transport motors!

Each member has found an application for the Commodore computer, which usually goes beyond what the manufacturers intended. A useful source of help and information is John Collins, who was a member of the group even before he became special software projects manager for Commodore. He is often able to provide information on new developments, and acts as an unofficial liaison between ICPUG committee members and Commodore.

The development of a co-operative attitude between ICPUG and CBM is fairly recent in origin, but it's a mutually helpful relationship which the computer clubs strengthen.

Mick Bignell is the club member who largely takes on the role of repairman. There's a wide range of equipment to maintain — three Pets, two 3040 double disk drives, a 3022 printer, a Vic 20 and 64, not to mention a selection of non-Commodore equipment including Epson, Apple, BBC, Apricot and Zenith machines.

Mick's work for hardware firm Microport includes the development of boards to generate 80 column displays on the Pet, and switchable hi-res display boards for the 64.

Roger Degoumois, by profession a chef, demonstrated his program Screen Calc, which runs on the Pet and 64. It's a user-friendly menu-driven calculation proram, which will cope with fairly complex formula-based calculations in fields such as investment and loans. As a bonus it will perform mathematical calculations and hex/dec conversions. Since the base formula is user-definable, any series of calculations can be programmed to the user's requirements.

In comparison to commercially available programs such as Visicalc, Screen Calc might be less powerful, but it's certainly easier to use, since all options are continuously displayed on the screen and there's rarely any need to refer to the manual. Roger doesn't use the program for business purposes, through he does use his home computer to print out menus — for meals, that is!

Obviously the North London group includes members with wide ranging interests and backgrounds. The meetings are informal, and more often than not adjourn to a local hostelry once the latest piece of hardware or software has been dissected.

Group members studying the latest software

Centre of attention on this night was a disk-based voice synthesis program for the 64. Produced by Tronix of California, the system uses no additional hardware, and can synthesise a wide range of voice types, by altering the pitch and filter settings of the SID chip. Examples include a little old lady — not very convincing — and an extra-terrestrial — perhaps more believable!

The group spent some time experimenting with the system, referring to the handbook only when things became hopelessly confused. The overall verdict on the program was negative — few members were impressed with the quality of the speech synthesis, comparing it with Commodore's own Magic Voice system.

Back-up

With this out of the way, talk turned to the use and abuse of computer systems generally. One member recounted his experience with a company who relied so heavily on their computer that they destroyed credit transaction records when they were computerised, only to find that after a masive thunderstorm all their records were wiped clean — a good argument for back-up systems!

Another member, a pharmacist by trade, explained how National Health Service plans to computerise prescription records were being implemented so badly that it takes much longer to use the computer system than it does to use the old-fashioned card index.

Commodore's John Collins had some interesting news about the forthcoming Compunet database system, and then discussed the new CBM computers. Understandably the club members are itching to get their hands on the 264, and tantalising mentions of more hardware to come served to whet their appetites further.

For information on the North London group, contact Barry Miles at the Business Studies Department, Polytechnic of North London, Holloway Road, London W7. ■

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£150,000 in prizes to be won!

The Challenge. Commodore Computers are pleased to announce their first International Computer Art Challenge, and invite entrants to submit their work for judging by June 1st, 1984.

Entries for this important new competition must be generated on Commodore 64 or Vic 20 computers, and may consist of either a still picture or of dynamic graphics of no more than 60 seconds duration.

There are three age categories: under 12; 12 to 17; and 18 years or over. All entrants must be able to demonstrate their skill on Commodore equipment and explain their methods and development of their entry if required to do so by the panel of judges.

Prizes in each of the 3 age groups and the 4 entry classifications (explained in the leaflet) are as follows:

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All entrants will receive a certificate of entry. There are no cash alternatives to any of these prizes.

How to enter. Leaflets with full details of the Challenge and the entry form are available at Commodore dealers, Commodore User Clubs, most major retail computer shops and at stores with a computer department. In case of difficulty or for additional copies, please write to:

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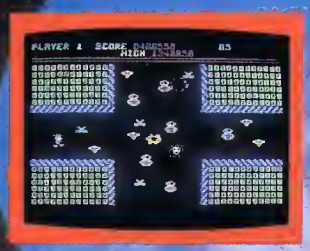

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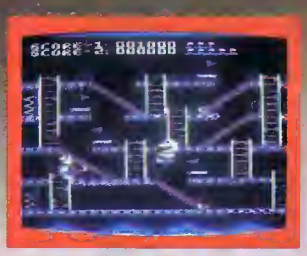

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NEWS DESK

Making cash from graphics

Scope debuts

Scope, the games design language developed by ISP, is now available for the Commodore 64.

Since our news story in the March edition, the program has been extensively revised, taking into account the experience gained on the Spectrum version.

Scope adds 48 commands to the 64's version of Microsoft Basic, which deal with sound and graphics in such a way that the writing of original games — not based on any pre-programmed pattern — becomes much more straightforward.

ISP marketing manager Graham Lomax explained that with a sound understanding of Basic, you can use Scope to write games in one tenth of the time you would need if working without it.

"The real breakthrough is that the program you write is then compiled in 100% machine code. The commands themselves are all clearly explained in the manual, and to give you an idea how much time you can save, a simple sound routine using one Scope command plus a pitch amount would take nine separate pokes in Microsoft Basic."

Scope users will be able to join a users' club with a help hotline, and ISP is negotiating with several large software houses for the rights to use Scope in games designs.

Programmer Allen Pendle said "We want to make it clear that Scope is a powerful utility with great potential, and ISP will support users of Scope as far as possible.

"Should anyone wish to release a game written with Scope, we will provide any technical help necessary, and as it will obviously reflect well on ISP, we wouldn't be insisting on having publishing rights."

A range of ISP programs in the graphics and programming field will follow over the next few months, and distribution will be through all major software retailers.

COMMODORE is to launch two graphic art packages backed by an international computer art competition.

The contest, launched on March 1st, offers prizes worth a total of more than £150,000.

Top prize in each of the four main host countries — Britain, Germany, the USA and Canada — is a £5,000 endowment to study computer graphics at an educational establishment of the winner's choice. There are also equipment prizes.

Entries must be generated on the 64 or Vic 20, and can be a still picture or a dynamic routine of up to 60 seconds duration.

There are three age groups, and sub sections for abstract or realistic art.

By happy coincidence Commodore is about to launch two art software packages.

The first, Rolf Harris' Computer Art, will be available on cassette for less than £10, and also on disk. It's a low-res "building-block" type program, in which the various graphic characters of the 64 can be placed on the screen under joystick control, and a wide range of colour effects accessed from a menu.

Written by "Face Ache" author Paul Jay, the program is expected to appeal largely to younger users.

For the more advanced artist, Tony Hart's Art Master is a hi-res program written by Dave Byrden. Again, it's menu driven using a joystick and keys, but in this program the full hi-res capability of the 64 is used. Lines, points, boxes, arcs and circles can be drawn, and the full range of colours used to create highly detailed works of art.

Add-on market grows

ECONOMY is the keynote for several newly-released CBM compatible peripherals.

Seikosha printers, distributed by DRG Business Systems, now include a 64/Vic 20 compatible dot matrix model at the reduced price of £173 + VAT.

The GP100VC is an 80 column device working at 50 cps, taking a paper width up to 10 inches with tractor feed. The Commodore character set and graphics are fully supported, although there are no true descenders.

Because the interface is serial, the printer is directly compatible with CBM machines. The bad news is that you'll have to move fast to get the GP100VC — DRG is to discontinue distribution of the machine soon, but there are still stocks in major retailers.

Even cheaper is the Softex Alphacom system, at £79.90. The Alphacom 32 printer was originally designed for use with Sinclair computers, and prints on plain 11 cm paper rolls with 64 columns of print at 90 cps. Print can be blue or black, and the full character/graphic set is supported via the special interface.

There's a word processing program available for the Vic 20 at £9.95, with a 64 version to come. Contact Softex at 37 Wheaton Road, Bournemouth; phone (0202) 422028.

Philips' new hi-res monitor, the V7001 — Vic and 64 compatible.

Electronics giant Philips has released a 12 inch monochrome monitor, priced around £70.00. The V7001 is compatible with the 64 and Vic 20, and has a green screen tint. Special circuitry minimises distortion, and there's a speaker for sound output. The unit will be available through high street electrical retailers.

There's a modem from OEL, the Telemod 2V23. Prestel and Micronet can be accessed through the modem, which costs around £84. OEL provides an appropriate hardware interface for the 64, though there's an extra charge of between £15 and £80 for various communications software packages.

The modem operates at 1200/1200 baud (half duplex). For further information contact OEL at North Point, Gilwilly Industrial Estate, Penrith, Cumbria; phone (0768) 66748.

64 hardware

Prices include VAT and carriage (UK)! If software is ordered at the same time a further discount on hardware of 1% is offered for each £30 software bought (limit is 5% extra discount). For example, ordering £150 or more of software at the same time as package (o) reduces its price by £19.35.

Product	OUR PRICE
(a) Commodore 64	£195
(b) 1530 cassette unbit!!	£45
(c) 1541 disk unit	£199
(d) SX64 + £250 software	£B50
(e) MS801 printer	£199
(f) 1526 printer	£310
(g) Epson FXB0	£400
(h) Epson RXB0	£260
(i) 1701 monitor	£210
(j) Parallel interface to link 64 to (g)	£25
(k) Interface to convert any cassette recorder to 64/Vic 20 use	£25

(Offers subject to Commodore supply)

Product	OUR PRICE
(n) Package (a) + (b)	£230
(o) Packe (a) + (c)	£387
(p) Package (a) + (c) + (e) + Easy Scripts, Easy File and Intro to Basic	£620

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software selection

This is a selection of some of the best programs for the Commodore 64 from a list of over 800 we can supply, covering the products of 100+ software houses from the UK, rest of Europe, and the USA. a 20-page listing and later updates are available free to customers (otherwise 50p and large SAE). Add 50p postage for orders under £20. £1 per item on all software orders to Europe.

Please note that the prefix (d) before a price denotes that the program is available on disk (for example d25). The prefix (r) (as in r29) indicates that the program is in cartridge form and costs £29.00. Tape programs prices have no prefix. Thus (d29 16) indicates a disk version at £29.00 and a tape version at £16.00.

WORD PROCESSING

PAPERCLIP (d90) is the most sophisticated and versatile wp program for the 64. Very good too is **VIZAWRITE** (r78 d75) which has a spell-check program **VIZASPELLL** (d20 if bought with **VIZAWRITE**, else d65). But for casual wordprocessing of extreme sophistication we recommend **HOMEWORD** (d35) which is outstanding value and very easy to master. It uses 'icons' to symbolize menu options (as used by Lisa). Contains several really innovative features. Mail label programs available to match.

UTILITIES

DISCO (9.95) can be used to transfer most of your tape-based programs onto disk — a must for all disk users. **DISKEY** (d36) is a really powerful disk editor which enables you to manipulate fully your 1541 and files produced on it. **PROGRAMMER'S UTILITIES** (d14.99) surely represents the best value if you have a disk: sprite, character, and sound editors are provided in addition to a PET emulator, and disk copy utilities — a dozen in all! **COMPACTOR** (d10.50 B.50) cuts out all wasteful programming including REMs and spaces. This can speed up programs and salvage memory. Various good quality sprite and character editors are available including **SUPERFONT** 4.0 (6.75) **SPRITES/ GRAPHICS EDITOR** (5.99) **SPRITEMAKER** 64 (5.75). On the music side there's **MUSIC COMPOSER** (r9.99) **ULTISYNTH** (14.95) **SYNTHESOUND** (r25 d25) amongst aothers. **GRAPHIX** 64 (d13.50 11) helps you use the fabulous graphics capabilities.

PROGRAMMING AIDS

These range from improvements to C64 BASIC to actual programming aids. **SIMONS BASIC** (r50) adds 114 extra commands and facilities, and the rather better planned program **BC BASIC** (r50 17.95) does must the same. Best of the compilers and excellent value is **PETSPEED** (d50). For database generation we highly recommend **THE LAST ONE** (d95) and **CODE-WRITER** (dB5) — both produce standalone code which can be compiled. On the machine code front there are numerous monitors and assemblers the best of which is **MIKRO ASSEMBLER** (r53) but **MONITOR** (r29.95) **ASSEMBLER DEVELOPMENT** (d24.95) **HESMON 64** (r29) and **MASTERCODE ASSEMBLER** (14.95) can all oe recommended. If you want to learn about machine code programming we suggest **ASSEMBLER TUTOR (d29.95 29.95) or Honeyfold's BEGINNER'S ASSEMBLY LANGUAGE PROGRAMMING** (14.95). A multifunciton utility which adds many disk commands to the 64 is the highly acclaimed **VICTREE** (r56). **ARROW** (r44) has a TIM monitor, renumber and delete, as well as offering tape LOADs/SAVEs at disk speeds!

DATAFILES/DATABASES

Unquestionably the one program to have if you can afford it is **SUPERBASE** 64 (d8B) which we have on special offer by way of encouragement! This is a sophisticated programmable relational database. Think of what you would like your database program to do — and SuperBASE will probably be able to do it! Full user support service. **INFODISK** (d73) and **DELPHI'S ORACLE** (d90) are very similar and offer larger individual records but more restricted programming constraints. Multifunction databases include the excellent **MAGPIE** 64 (r95) **INFOMAST** (d90) and **VIZASTAR** (d99). All these programs are capable of serious disk-orientated business applications. **DIARY** 64 (r30) is a really excellent 'single page' datafile for tape or disk records. For cassette users we recommend the good-value **INFOTAPE** (16.50).

FINANCE & BUSINESS

CALCRESULT is a very sophisticated 3D spreadsheet we highly recommend for serious business uses. **PRACTICALC** (d40 35) is very good value. Also; **FUTURE FINANCE** (d75) and **BUSICALC** 2 (d79 77). For home accounts there's **BANK MANAGER** (d10 7.50) **HOUSEHOLD FINANCE** (21) **MONEY MANAGER** (9.99) the very sophisticated **HOME ACCOUNTANT** (d52.50) **TIME & MONEY MANAGER** (d49). Busines account programs are available also. These usually form part of a suite of related business programs. For a low cost example **BUSCOM-1, BUSCOM-2, BUSCOM-3** and **BUSCOM-4** are for monthly accounts, wages, retail accounts, and stock system respectively (all d21 19 — demonstration versions at d4.50 2.50 each). For VAT and financial record-keeping and a full audit trail we unreservedly recommend **MICRO SIMPLEX** 64 (d175). A professional program perfect for the small business (suits VAT schemes A-F). Demo available against deposit.

RECREATIONAL

We can supply any of the popular games from established software houses and this includes an unbeatable selection of imported material. If there's a program for the 64 . . . we can usually provide it! Also available are a whole series of excellent war and strategy games — **KNIGHTS OF THE DESERT, COMBAT LEADER, EAGLES** (d29 29 each) and others. Learning games for adults include **TYPING TUTOR** (d17.50 15.50) **GRAND MASTER** chess (17.50) and **SPEED READER** (d48). Look out for **ALICE IN WONDERLAND** (d27) and the definitive C64 **FLIGHT SIMULATOR II** (d35). Really good imports include **BLUE MAX** (d25 25) **PROTECTOR II** (d25 25) **FORT APOCALYPSE** (d23 23) **PITSTOP** (r27.50) **JUMPMAN** (d27.50 27.50) and **JUMPMAN JUNIOR** (r27.50) . . . but there are many others! Interested in adventuring? Highly recommended are the following: **COLOSSAL ADVENTURE, ADVENTURE QUEST, DUNGEON ADVENTURE, SNOWBALL, LORDS OF TIME,** and **TWIN KINGDOM VALLEY** (9.50 each), **THE HOBBIT** (14.50), plus Infocom's **ZORK I/II/III, STARCROSS** (d29 each), **WITNESS, DEADLINE, SUSPENDED, ENCHANTER, INFIDEL, PLANETFALL** (d36 each). And No. 64 is complete without **INTERNATIONAL SOCCER** (r9.99) but there are now a host of other CBM cartridge games . . .

Our list includes details of EDUCATIONAL, ACCOUNTING, BUSINESS and GAMES programs not possible to itemize here. PLEASE TRY US IF YOU ARE HAVING DIFFICULTY LOCATING A PROGRAM. Please make cheques/POs payable to The Six-Four Supplies Company.

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Cartridge networks

PLANS FOR networks retailing cartridge-based software are beginning to emerge.

The idea is to set up "vending machines" in large retailers. The customer buys a blank cartridge and pays a connection fee, and the software of his choice is downloaded from a master computer. When you're tired of the game you can wipe the cartridge and fill it with a new program, or buy another cartridge.

Prism Software Products is setting up a network called Romox, based on the IBM PC/XT which can store up to 500 master programs. Initially, 40 Romox machines will be operating.

An alternative system is reported to be Cumma, backed by Atari founder Nolan Bushnell. This system is claimed to be more suitable for the transmission of business software as well as games, but initial plans are said to use a modified Coleco games system to dump software to the BBC, Sinclair and CBM machines.

Prism's Paul Duffey says that charges to retailers would be on a sliding scale, with free rent over a certain figure.

"The 7-8 minute downloading routine will be automatically carried out by the main system overnight. Thereafter the terminal stands alone. Once the full system is operating, it will give credibility to the software charts, and give retailers an opportunity to sell software without storage and cashflow problems."

Roll up, roll up

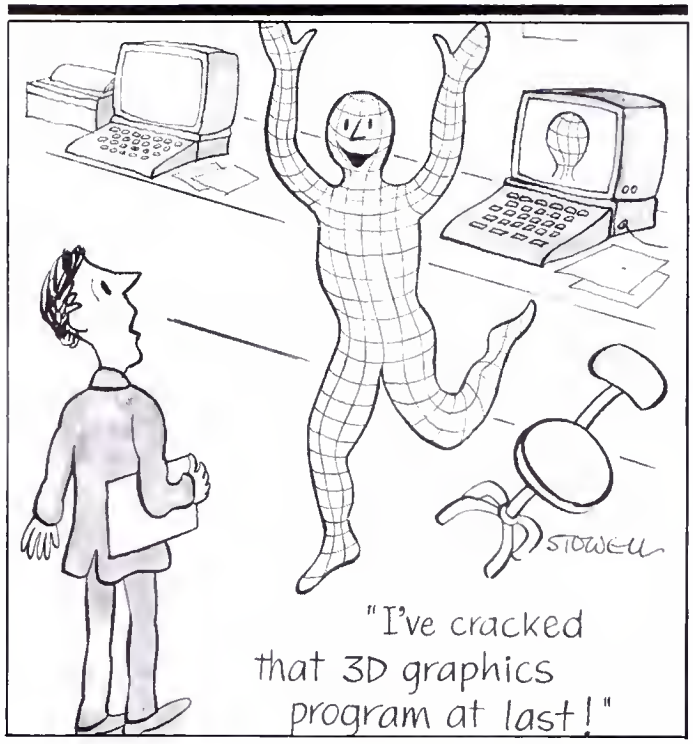
COMMODORE has announced plans for the fifth annual CBM computer show.

The show will be held in the Novotel Hotel, in Hammersmith, London, from the 7th to the 9th of June.

Among many products on display we're promised the new 264 machine, which boasts 121 colours and inbuilt software. The portable SX-64 will also be on show.

Over 400 exhibitors will be present, demonstrating their ranges of business and games hardware and software, including Audiogenic, Llamasoft, Precision and Anirog.

The user's group ICPUG will be represented, as will *Commodore Horizons*. Look for us on stand 20, upper level. More details of the show will be in the next issue of *Horizons*.



Howard Stanworth, general manager of Commodore UK, pictured outside the Corby site of CBM's new microcomputer factory. Phase one of the Corby project involves a £6 million investment, and up to 1,000 jobs will be created in the next year. The factory will assemble the Vic, 64, and new models.

Games strike back

THE RANGE of games software for the Vic and 64 continues to expand, with several releases from companies new to the CBM machines, as well as offerings from already established firms.

Anirog has released Space Pilot, a version of the arcade favourite Time Pilot, in which you control a fighter craft through five time periods, battling against enemies of increasing ferocity. Galaxy, also for the 64, is a version of Galaxian, with a hundred different screens of action. Each game costs £7.95.

All Anirog games for the 64 are now recorded using Turbo, a German-developed fast-loading routine which means that tape games will load at disk speeds.

Anirog has also released Bongo and Star Defender for the Vic with 16K expansion, at £7.95.

Imagine strikes back with Pedro, featuring Mike Glover's Injectaload routine, which allows 30K to be loaded in two minutes.

In Pedro, an oblique 3D screen shows Pedro the gardener trying to plant seeds in the face of attack from ants, donkeys and other intruders.

Pedro costs £5.50, and comes with a new style insert card which includes screen shots.

From Audiogenic comes a new range of disk-based games, some of which are reviewed elsewhere in this issue. Forbidden Forest, Slinky, Frantic Freddie, Aztec Challenge and Pegasis retail at £12.95.

Thorn-EMI is to return to the games software field with a range of 64 and Vic games, some of which have been seen previously on cartridge. Titles include Submarine Commander, Mine Madness and Computer War for the Vic.

Leading off for the 64 are Slurpy, a cute character game, and Black Hawk, a combined arcade/strategy flying game featuring advanced graphics.

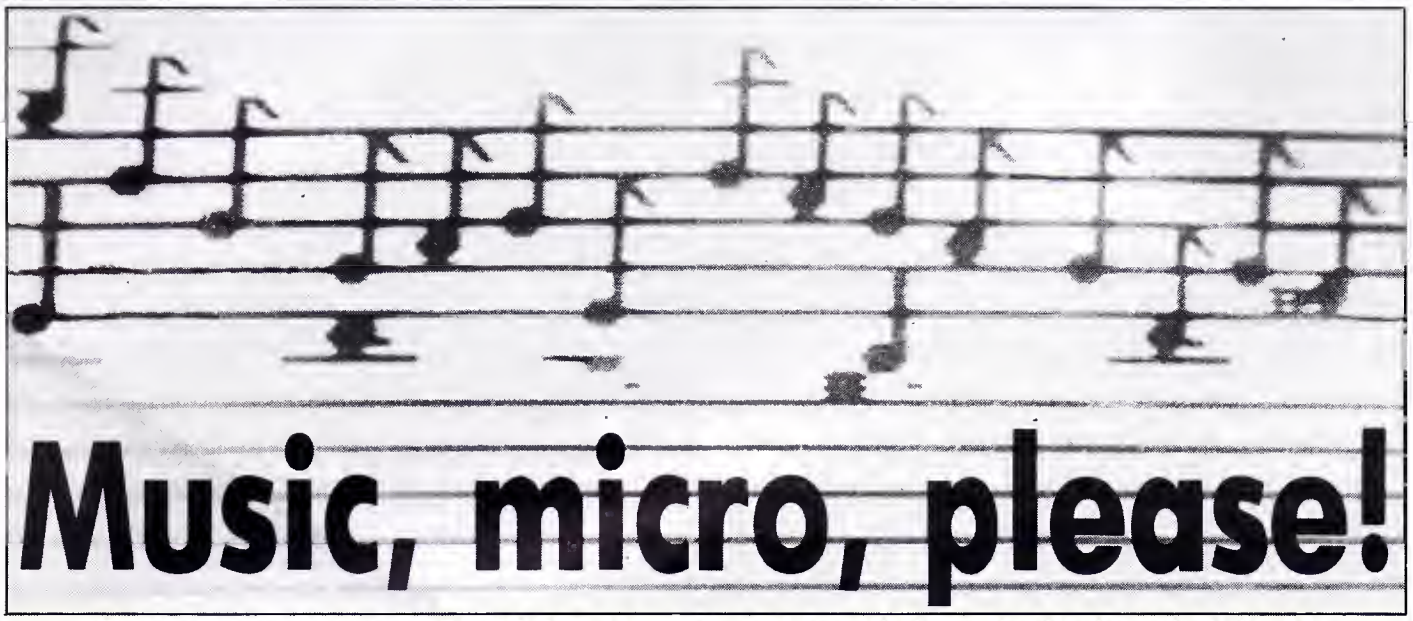
Thorn cassettes will cost £5.95, and cartridges £9.95.

Allrian Data Services, which has produced 30 programs for Atari machines, is now busy transferring them to the Commodore computers. Alley-Oops is a mixture of bowling and Space Invaders for the 64, costing £7.99.

For the 64 and Vic with 16K, there's a one-player version of Bridge, again at £7.99. Allrian promises a graphic adventure, Gwendolyn, and several educational programs soon.

Peaksoft has released The Boss, for the 64, a football management simulation featuring 13 screens. The package includes a free game save tape, since The Boss is said to be too complex to play in one sitting.

Lastly, relative newcomer Mogul launches nine new games, initially on cassette at £7.95, with disk versions to follow. Titles include Fire Ant, Cave Kooks, Labyrinth of the Creator and Chomper Man for the 64, and Ludwig's Lemon Lazers for the Vic 20.



Music, micro, please!

Electronic music expert ***David Fox*** *coaxes sweet sounds from the keyboard of the 64*

WHEN THE LAST Space Invader bites the dust, and Bilbo the Hobbit has waddled off into the sunset, what can you do with your highly versatile home micro? Increasing numbers of enthusiasts are finding new challenges in the world of music, and hanging up their laser pistols in favour of the conductor's baton or even the (subjective) axe-hero's (hypothetical) guitar.

The Commodore 64 is particularly well-qualified for a musical career and software houses, hardware designers and musical instrument manufacturers all have 64-compatible products available. Your 64 can make sweet music (or otherwise) in three different ways — using its built-in SID sound chip, using external keyboards and sound-producing hardware, and controlling existing commercial musical instruments such as synthesizers. We'll look at each of these functions in turn.

The 64 is among the more well-endowed in musical terms, having three independent sound generators doubling as white noise generators. White noise is most commonly used for explosions and sound effects in games, but is the main component of percussion sounds if you want to produce some rhythmic backing for your musical efforts. The sound generators have programmable waveform, which means that you can decide the overall nature of the sound produced — flutes have a soft sound with few high harmonics (sine wave), oboes or strings a harsher sound with a good mix of higher harmonics (square wave or sawtooth wave). In addition the sounds on the 64 can be internally filtered, changing the harmonic content and thus the overall impression produced, and can be ring modulated, producing clanging metallic sounds. The use of all these sounds in games will be quite familiar, but it's only a matter of arranging them into single notes and recognisable scales to turn your micro into a musical instrument.

Several software packages are already available to help define both the exact sound used and the patterns and tunes which are played. One of the most flexible is Ultisynth 64 from Quicksilva, costing £14.95 on cassette, which displays all the Commodore's music capabilities in the format of a commercial synthesizer. The menu-driven program, in other words, gives a graphic display of all the dials and knobs familiar from a synth such as the classic Minimoog (so beloved of musicians that Rick Wakeman, for one, used to take five of the things on stage set up for different sounds) and allows you to adjust one parameter at a time until you've got the desired sound. Parameters include Attack (the amount of time the note takes to fade in), Decay (the amount of time it takes to fade away if you hold the note), Sustain (the percentage of full volume it'll sound at if you hold the note) and Release (the amount of time taken to fade away if you release the note). These four make up the magic mantra ADSR, which has baffled people since synthesizers were a twinkle in Robert Moog's eye, and which helps to define whether a sound seems like a piano, organ or violin, for instance.

Octaves

Ultisynth also has a wide range of pitches (eight octaves in fact), various filtering options, ring modulation and pulse width control (affecting the sound quality of square waves). But these are the least of its capabilities, because once you've decided the sound you want to use the fun really really starts. Ultisynth can then play various automatic rhythms for you to accompany on the computer's keys, or even on an optional music keyboard such as the Microsound 64 (which we'll look at later). You can obtain some degree of real-time control over functions such as filter position; edit and create new backing rhythms; and define files for your compositions. Ultisynth is a lot of fun, certainly giving some valuable insights into music synthesis, but it's not exactly the sort of thing you can dabble with on a whim — however, the micro equivalent of bathtime vocalists are well catered for by another 64 program. Dancing Feats from Artic Computing, costing £6.95 on tape.

Joystick

Dancing Feats may be poorly named, because there's no dancing involved even if there are some spectacular feats of musicianship. Basically the program gives you a cross between the intellectual thrill of composition, like Beethoven hunched over his work table with a scratchy quill pen, and the more physical delights of live performance, like Mick Jagger striding up and down the stage making lewd gestures with a microphone stand. This all comes about through the magic of joystick control, which implies naturally enough that you need a joystick to run the thing.

The joystick initially allows you to select options from a menu, the first page of which asks you to choose Bass, Beat, Style, Tempo or Ending. Bass patterns available include Jazz, Rock, Blues and Boogie Woogie, and once selected you can go on to specify the other options, choosing appropriate or totally inappropriate settings according to your mood. The list of Endings is particularly witty, including as it does The Elvis (a down South blues thrash-about) and The Mozart (a pseudo-classical series of deferred climaxes). Once you've made all the selections the program draws a bar chart and all hell breaks loose as the accompaniment begins, with a percussion line and independent bass line leaving the joystick free to play a melody line over the top. Because the scale you play is all part of the program it's impossible to play a wrong note, and the scale played by the joystick will alter to compensate for the changes in the backing chords. Circular movements of the joystick produce fast runs while up-and-down motions ▶

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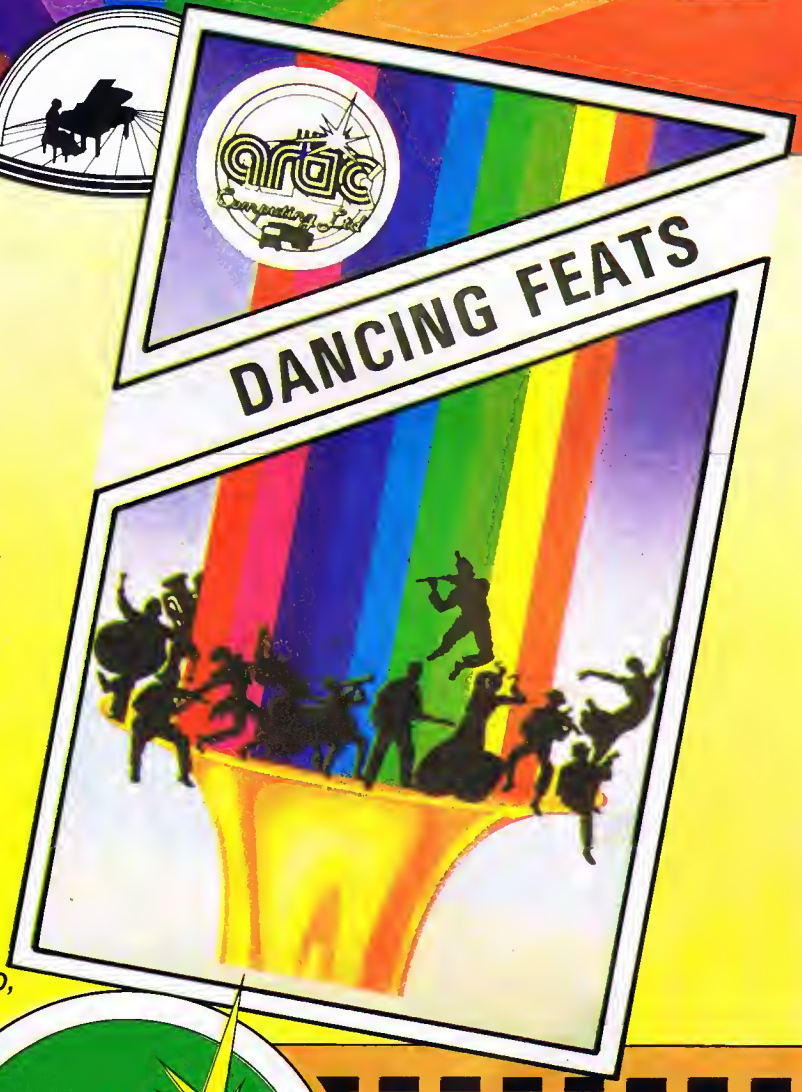

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THE HOTTEST GAMES IN TOWN FROM LLAMASOFT

HELL GATE

HELL GATE on the 64 is certainly no REVENGE or HOVER BOVVER, being the VIC 20 code tweaked to run on this system. However we are offering it at a bargain price to those who like an unusual shoot-'em-up, fans of Gridrunner and Matrix should enjoy themselves and the game is challanging to all.
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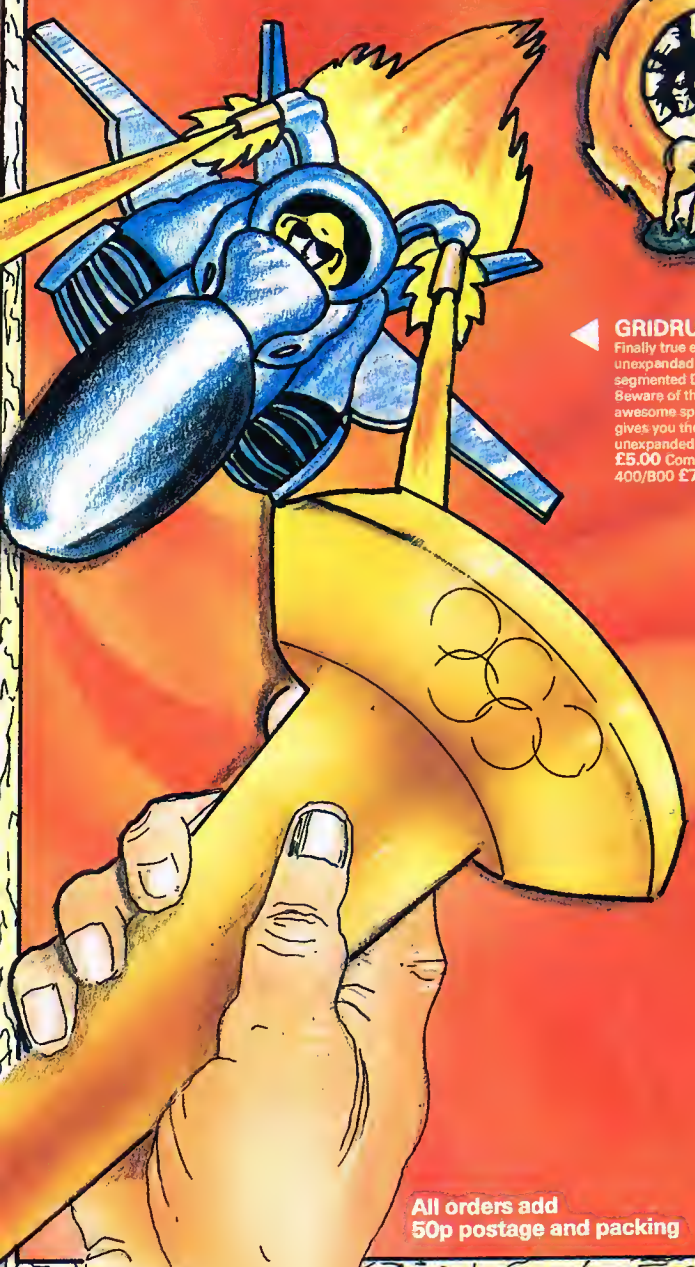

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At last the long awaited sequel to Attack of the Mutant Camels is available. You are controlling a ninety foot high, neutronium shielded lazer spitting death camel; leading a rebellion against your evil Zzyaxian overlords. The game features beautiful smooth scrolling graphics and no less than 42 different attack waves, more than any game in video history. The challange of play will last for months as you battle to see what's on the next wave.

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◀ will produce single notes. To finish a musical phrase you only have to return the joystick to its top position, and to drop an octave you simply hit the fire button. To end a composition, simply release the joystick and hit the space bar, and your chosen ending will take place — this can be after anything up to fifteen minutes of frenzied musical creation, all accompanied by the most eye-catching visual display this side of Top Of The Pops.

It's possible to develop a degree of skill on the Dancing Feats joystick, although anyone who can produce a particular tune at will must have had an overdose of it. A fun program though, and one which can give you a finished musical product (of sorts) with minimal effort.

Cringe

Rather more complex is a cartridge-based system, Music Composer, manufactured by Commodore itself at £9.99. This comes with a jolly booklet opening with the phrases "Are you tone deaf? Do people cringe when you sing or play an instrument? You have just purchased your salvation — welcome to the wonderful world of electronic music". Music Composer is intended to be usable by people with 'absolutely no musical ability', which sounds promising, as does the sample tune which comes up together with a musical display on hitting 'I' after loading.

Music Composer lets you get at the 64's three sound sources and displays their activities in three different colours. The top rows of the computer keyboard become a musical keyboard with a choice of sounds including calliope (steam organ — a bit low-tech in these sophisticated times), harpsichord and piano, with each of the computer's sound generators being able to give a different effect. The graphic display is a musical stave of five lines and notes are entered using a very simple language based on musical notes (A,B,C etc) together with sharp or flat, and a number to indicate which voice is required. Phrases to be repeated can be entered in brackets and octaves can be changed with + and − signs, or by specifying a particular octave with the command O.

The handbook gives example notation for a complete song using three voices, and then goes on to defining your own sounds, using a selection of the same sort of effects as those used in Ultisynth. Notes entered can be removed and replaced, and the completed piece is shown as a moving graphic display complete with notification of which effects (such as vibrato) are in use, and which waveform is sounding.

Music Composer is very educational in musical terms, even if you do have to do most of the educating yourself — in other words, there aren't many hints on compositional techniques included. There's no rhythmic backing provided except what you might write yourself, but there are few limitations on what can be done with a little time and practice. Some very complex three-part harmony pieces can be produced, and this sort of program is ideal for anybody interested in the counterpoint of Bach's style of music. Anybody more interested in Eric Clapton can wait until later.

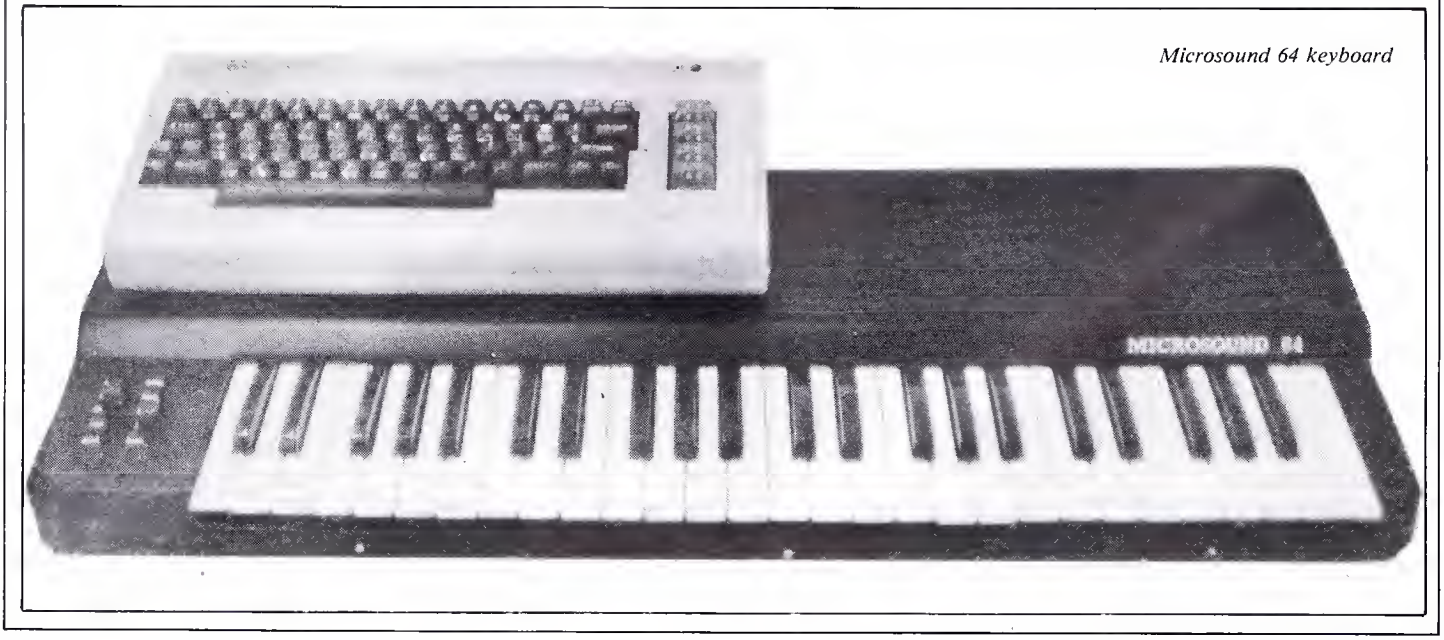
Hardware

We've looked at the 64's built-in sound facilities and at some programs designed to organise them into a useable form (remembering that due to the odd Commodore Basic a normal sound routine would involve a lot of POKEing, and so would be fairly unwieldy). These could well appeal to micro enthusiasts dabbling in music, but once you've got the electronic music bug, or if you're already a reasonable musician, you'll want a more familiar form of control. A couple of hardware manufacturers are now producing conventional music keyboards which can be used in conjunction with the 64 and with some of the software we've mentioned, one example being Autographics with its Microsound 64.

Microsound 64 is a full-sized, four-octave keyboard (a decent size for commercial synthesizers) which can control the 64's sound generators, which in turn can be under the control of Ultisynth or a similar sound-defining package. It offers two user-definable real-time controllers (corresponding to the vibrato and pitch bend controls on a more conventional synthesizer perhaps) and a selection of special functions. Eventually these will include 0.8 second single-note real sound sampling, the latest buzz word in the wacky world of music technology. The ability to record, modify and replay real sounds at musical pitches has proved a great boon to a musical community which was becoming bored with plinky-plonk synthesizer sounds, and now perhaps the commercial success of Yazoo with their £20,000 Fairlight Computer Musical Instrument can be yours for a mere £145. Development engineer Glyn Williams was in fact invited to study the Fairlight at the BBC's Radiophonic Workshop, and has incorporated some of the details of its proverbially user-friendly programming into the Microsound. Contact Autographics at 3A Reading Road, Henley, Oxon, phone 0491 575469.

Hardware doesn't end with the Microsound however, in fact there is an almost infinite range of musical goodies about to become accessible for 64 owners. This is due to two connected factors — the popularity of the 64 in America, and the development in the same country of the concept of MIDI, the Musical Instrument Digital Interface.

MIDI came to light about a year ago as a result of the fact that several million synthesizer owners were cheesed off because none of their equipment would work with any other equipment — or more specifically, that of other manufacturers. One company might make the best synthesizer, one the best drum machine and a third the best sequencer, but because musical instrument manufacturers largely went their own ways none of these designs would be compatible. Obviously there was some mileage in making the public buy everything from your own range, but eventually the manufacturers about-faced and decided that universal compatibility was the name of the game. The first move was made by Sequential Circuits, makers of the successful ▶



Microsound 64 keyboard

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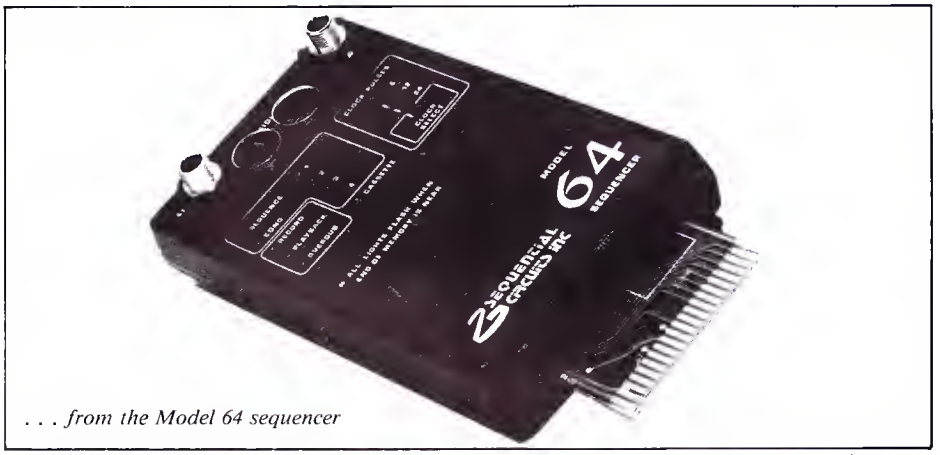
◀Prophet synths, and an agreement was reached with the major American and Japanese manufacturers for a USI (Universal Synthesizer Interface) which eventually developed into MIDI.

MIDI, as its name implies, is only suitable for digital or microprocessor-controlled synths, and is a serial interface rather similar to the RS232 familiar from printer ports and suchlike. This means that a relatively simple converter will allow your humble micro to speak MIDI, and thus to control anything up to a third of a million pounds worth of high technology keyboards (this is assuming that it's possible to get eighteen Fairlights in the same room — failing that, eighteen Prophet 600's, Roland Jupiter 6's, or Korg Poly 61's will do nicely).

Sequential Circuits publish a detailed specification for MIDI which all participating manufacturers are expected to follow. This gives the appropriate data bits for the 'flags' which tell instruments what they're going to be asked to do (play a particular note, change a sound or go to a new rhythm pattern for instance) and then the codes for selecting particular notes, sounds or patterns. There are also plenty of free options so that any features unique to a particular instrument can be brought under MIDI control at the manufacturer's discretion. MIDI as she is spoke can account for up to sixteen channels of operation, so most interfacing equipment available allows the user to specify which of sixteen instruments is being controlled at any given time. As we mentioned, MIDI is serial, which doesn't mean that you can only use it at breakfast time but that it only accepts one bit of information at a time. Some companies objected that the delays associated with waiting for sufficient information to arrive could become perceptible in a complex system (Oberheim, CBS/Fender and Synclavier to name but a few), but these unbelievers are rapidly becoming converted by the fear of being left out, and are getting MIDIfied pretty quickly. Most of these had been experimenting with computer interfacing on their own systems, and so were already familiar with models such as the 64 — CBS/Fender using it to control the powerful Chroma-synth for instance.

Let's look at one 64 product, Sequential Circuits' Model 64 Sequencer. This slots onto the cartridge port and is a little black box ornamented with a few



. . . from the Model 64 sequencer

LED's and some DIP switches. These are used to adjust the clock output to drum machines and other sequencers from 96 pulses per quarter note (PPQN) to 48, 24, 12 or 6 (6 being needed for the popular Roland drum machines such as the £180 TR606 Drumatix). The LED's obviate the need for a monitor (a good word, obviate, and not one that you get a chance to use often) because they show the percentage of memory available, and whether the sequencer's in Record or Replay mode. Sequences are played as normal on the synthesizer's keyboard, and corrected with variable resolution by the computer, which can hold up to nine sequences totalling a few thousand notes and merge these basic patterns as desired. The exact number of notes stored depends on the number of spaces betwen notes and so on, but the system's fully polyphonic and so can cope with chords, lead and rhythm parts quite happily. Pitch bend and modulation effects can also be stored, and of course completed sequences can be dumped to tape or microdrive (although anyone trying to load his next tune from tape in the middle of a set deserves a gold medal for bravery).

You can use a monitor with the Model 64, in which case you get helpful questions like 'Are you sure you want to erase this pattern?' in addition to musical staves and various displays of compositional options in a menu-driven format. Being entirely software-based it's likely that further developments will follow rapidly, one of the first probably being a step time sequencer for people who want to enter music one note at a time and/or can't play a keyboard. Further information on the 64 sequencer is probably best gained from Rod Argent's Keyboards at 20 Denmark Street, London, where they have a constant demo set-up which does amazing things with a Yamaha DX7, Prophet T8, SCI Six-Trak and a drum machine all at once, and all under the control of a humble 64.

The people who started it all, Moog Music, also have their eye on the 64. Their prototype system is called The Producer, was was recently seen controlling three drum machines and four monophonic Source synths all courtesy of MIDI and a 64. The 64 appears to have ample capacity for composing lengthy pieces in a variety of musical 'languages' and then over-dubbing other parts to the musician's delight — certainly the CBS/Fender Chroma provides an amazing compositional system with the Apple, and if the 64 can achieve half of that it would be a valuable tool. The recent Frankfurt Music Fair saw MIDI interfaces almost ten-a-penny, most of them compatible with the 64, and it only remains to be seen how many of them will find UK dealerships — certainly there should be enough competition to force prices in an agréeable downward direction.

Summing up then, the 64 adequately covers all the basic forms of computer and electronic music, or will do in the very near future. Sound effects are very easily produced, although the standard handbook doesn't really go deeply enough into the POKEing dictated by a form of Basic originally intended to support games cartridges more than user programs. Several good programs are available to compose your own music and make the most of the 64's internal sounds, and this may give you a taste for further musical explorations. If it does, you could do worse than buying a full music keyboard for the 64, especially as it should soon be possible to sample sounds.

If you want to go the whole hog, get a MIDI interface and a suitably equipped synth (currently starting at around £635 for the Korg Poly 800) and you're instantly at the peak of professional instrument technology. Incidentally, if you already own a small monophonic synthesizer which isn't MIDI-compatible, don't despair,, because there are also a selection of MIDI to analogue convertors available which will bring almost anything under the control of your 64. So now you've got no excuse for not becoming an accomplished micro musician! ■

Prophet T8 under control . . .

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EXTERMINATOR

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HUSTLER

Written in machine code and using Sprite graphics HUSTLER takes the 64 to its limits. There are six 'pool' type games for one or two players, high scores kept and super music. Machine code. See the great press reviews.

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GAMES SOFTWARE

A flea in my chariot

***Pete Gerrard** gears up and gets into drive overleaf*

VIOLENCE in the streets, drug abuse in schools, drunken driving, what have they all got in common?

None of them feature in two interesting games for the Commodore 64 from Quicksilva. (Well, it made you read this far at least.)

Booga-boo (the flea) is the first of these £7.95 offerings. From the title alone, you can see that this is not going to be (yawn) yet another version of Cosmic Pacoids, and indeed Booga-boo takes us into a strange new world "a million light years from home". Amazing what can happen when you load a program into a computer.

In this game you take on the role of a flea, who finds himself (herself?) on the aforementioned planet, deep, deep underground. Colourful vegetation abounds everywhere, mutli-coloured shelves of rock pop up all over the place, and way beyond the top of the screen is a little exit, which you must aim for.

This can be achieved by jumping from shelf to shelf, whilst trying to avoid the two venus fly traps that live at the bottom of the screen in the most awkward of positions. Venus fly traps being what they are, landing in one means instant death, so these are to be avoided.

Trapped

To make the flea jump, the joystick (no keyboard option) must be moved either left or right, and doing this sets a little indicator in motion. The strength of your jump is determined by the position of the indicator when the joystick is re-centred.

If the fire button is held down while the joystick is moved about, the screen scrolls in either of the four main directions, so that you can get a flea's-eye view of what you're (hopefully) about to leap onto.

After a few seconds of bumping into rocks and falling into Venus fly traps, our little flea is also set upon by a dragon, who bumbles about the screen only to turn up when least wanted or expected. The dragon is about as friendly as the fly traps, and so he too must be given a wide berth.

And so it goes on, jumping from level to level. The object of the game is to escape in the shortest time possible, and so far my little flea is still imprisoned a long way underground.

On the Spectrum version it's possible to get out in under 40 seconds, but things happen differently on the Commodore 64, so it looks like my flea will be hopping about for some while yet.

An enjoyable game, and clearly a lot of thought has gone into the use of graphics (but not sound, the background tune is irritating in the extreme, although you can turn it off).

Reading the instructions for a Quicksilva game can be rather like dropping into the pages of the Hitch-Hikers Guide to the Galaxy, since nothing ever seems to make much sense when you read it for the first time. Purple Turtles, again at £7.95, is no exception.

The purple turtle, or purpilious turtiliorium as Quicksilva prefer to call it, is an extremely rare beast that lives in the waters surrounding your home.

You start the game on the left hand side of the screen, and rather than looking like a flea you do manage to do a decent impersonation of a human in this one. Above your head in tree sits what looks like an owl, and to keep this owl happy you have to get over to the right hand side of the screen and collect some of the assorted fruit that falls out of the trees on that side.

Between you and the fruit there is a river inhabited by four purple turtles. To cross the river involves leaping onto the back of earth turtle in succession, taking care not to jump just as one of them's about to submerge. This leads you to a watery fate if you're not careful, but a good piece of turtle hopping will soon have you picking up the fruit and returning in triumph to your friend the owl.

Your reward for bearing fruit is to see the owl jump up and down in a frenzy of passion at seeing you return, although like most pets you suspect that his ardour is due more to the promise of some food rather than through any great love and affection for you.

Metamorphosis: if it moves, shoot it

Purple Turtles: an extremely rare species

After collecting a number of different fruits, the action begins to speed up a bit. The turtles, so slow and benevolent on the first level, rise and fall with greater rapidity, and by the time you've gone through three or four levels there are quite often two or even three turtles on the move at the same time. This leads rapidly to the end of the game, as your man gets submerged in water time after time after time.

At the start of the game you can preselect your starting level out of nine possible stages, and you can also select the starting speed as well, again from a choice of nine different speeds.

Another fun game, and, as Quicksilva remind us, this is aimed purely at the young at heart, and anyone who's tired of alien bashing. Until you've leapt on a few purple turtles, you haven't lived.

Enough of turtles and fleas and back to the aliens again, in Metamorphosis for the Commodore 64 from Mogul Communications Ltd.

Priced at £7.95 like most of their 64 games software, Metamorphosis is a game in four different stages. However, since none of the games players at Chez Gerrard ever managed to get beyond stage three, we'll have to restrict our comments to the first 75 per cent of the game.

Hung

Until you get the hang of the game (if it moves, shoot it, and if it don't, you might as well shoot it anyway), it's a bit disconcerting to find yourself starting at two screenfuls of tightly packed upper case only instructions before the action commences. The admittedly short loading time could have been spent in reading some instructions on the cassette inlay card, but since there aren't any . . . .

Once you do get started, you'll find that someone has discovered user defined graphics, since the game is liberally sprinkled with them.

The first screen is relatively straightforward, a mad dash for the exit at the top, as some strange purple and yellow force writhes about the screen in front of you. The purple parts merely impede progress, but the yellow parts are made of sterner stuff, and kill you on contact.

When you get to the top, and discover to your annoyance that you've managed to score a whole 170 points while the high-score display has room to accommodate scores in the mega millions, level two finds you in the nest of something called a Cyglorx, fighting off killer robots and bumping into the eggs to be found in this nest.

The robots are a grim lot, although this doesn't prevent them emitting a piercing little wail everytime you kill one of them.

And onto level three, which features more robots than a year's supply of Doctor Who, and getting beyond these has proved sadly impossible. Not through want of trying, but the sheer weight of numbers forced the end of the mission every time.

◀Not a particularly inspiring game, although it has it's moments.

Kongo Kong is another of Mogul's products, at the same price as Metamorphosis, and you'll never guess what this one's about. What's this? An ape has kidnapped your girlfriend and taken her to the top of a building? You've got to climb ladders and jump over barrels in order to rescue her? Haven't we seen this somewhere before?

Aped

Yes indeed, this is yet another version of Donkey Kong. I think if I see one more game featuring apes, frogs or pacmen, my hopes for the future of the computer industry will take a definite turn for the worse.

The graphics on this are not particularly inspiring, featuring as it does a few sprites, and the use of sound rarely rises above the ordinary. The plot is the same as every other version of Donkey Kong, and the four screens to be negotiated are identical in concept to the originals, as seen in so many different games that it's impossible to keep track on them all.

In fairness, it did have an addictive quality that goes with it simply being a version of Kong, if you like that sort of game. Two game-playing friends managed to find it a lot more exciting than I did, so if you have kids around who are just getting interested in computing and you want a few simple games to feed their interest on, you could do worse than starting with this.

Any cassette inlay card that bears the words 'Another superb game . . . we promise you won't be able to turn it off' is asking for trouble, bearing in mind the old adage about empty vessels making the most sound.

Fortunately, Gridtrap 64, £7.95 from the Sumlock software company, is a lot better than most of the games that come this way, and even if I did have to turn the machine off in order to write this review, I don't think many people will be sueing them for breach of promise.

The game takes place on a grid of fifteen by ten squares, and at the start of the game you, Mr. Livewire, must race about the grid and defuse the five bombs that someone has thoughtlessly left there.

Each bomb has a time limit of thirty seconds, after which it will explode. And although you start with just one bomb on the screen, if the count for any bomb gets down to fifteen seconds, a further one will appear.

Bumped

Every square you cross over on the grid disappears, and makes it impossible to backtrack over it, so your route must be plotted carefully. However, there is a feature which allows you to scroll entire rows (with certain restrictions), and so get back onto the path again.

Some of the squares you will find

A disk in time

AUDIOGENIC has just released a number of games for the Commodore 64 which have the unusual distinction of being supplied on disk, although users without access to a Commodore drive may purchase copies of the games on cassette. The disk versions will set you back £12.95, the cassette ones a mere £8.95.

For the extra £4.00 you not only get a disk, but also a stupifyingly boring screen display to look at while the main program is loading. People who purchase the cassette versions would be well advised to have a plentiful supply of coffee to hand, since the loading process takes a long time, even on disk. 28K is a lot of program.

With original ideas for games being thinner on the ground then elected members of the SDP at present, the sight of a game that can boast an unusual storyline is enough to send even the most jaded of computer hacks reaching for the Thesaurus in search of new words to describe the program.

Aztec Challenge places the player back in the 16th century in the capital of the once renowned Aztec empire. Being the poor old fool that you are, you have been sentenced to be a ritual sacrifice to the gods. Such was life in the old days.

You have, however, a chance of escape, and in order to avoid being sacrificed you have to complete an obstacle course known as the Aztec Challenge.

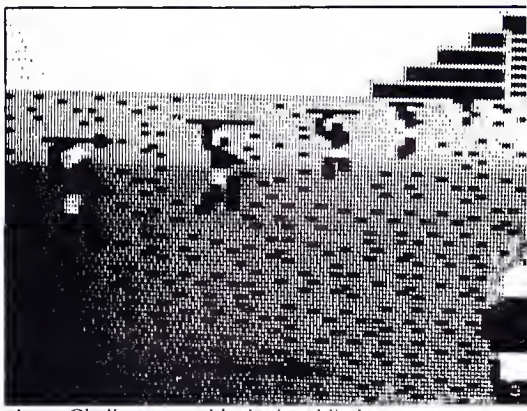
The somewhat gaudy box that the disk is supplied in features on its cover an Aztec maiden whose physical stature in certain areas is, well, interesting, to say the least. Behind her is the Aztec warrior who is trying to avoid being sacrificed. Quite what the maiden has to do with the game is uncertain, unless she puts in an appearance on the screen at some point. If she does, it's in a level far beyond any I've ever managed to reach.

There are seven levels of play in all, and completing all seven sends you back to the initial one, with the action considerably speeded up. A small illustration on the back of the box containing the disk suggests that on phase three (twice around all seven levels and back to the start again) we see a level of play that is not to be found on either of the previous two phases. However, some of us haven't managed to get that far . . . yet!

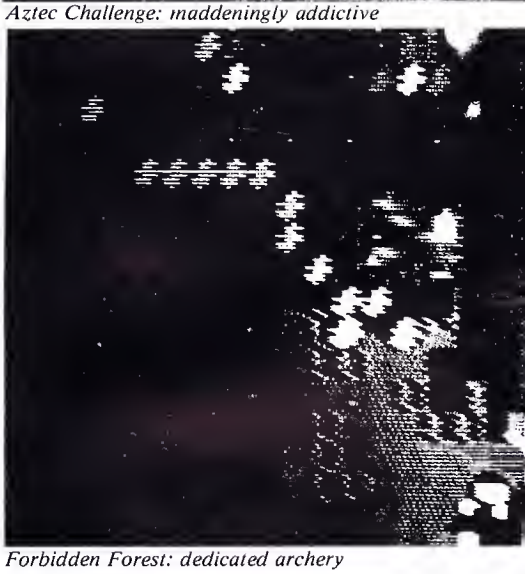
To briefly go through each level, on the first one you have to jump over or dodge under a rain of spears, on the second you must climb up a wall whilst dodging a collection of rocks pouring down it, the third has you leaping in and out of rooms over a selection of various hazards, the fourth forces you to leap over some 'Mexican Fauna' in the guise of various nasty spiders, lizards, snakes, and so on. By the time you get to the fifth level you'll be trying to avoid being ambushed by hidden Aztec "mafia", on the sixth you have to swim through a lake of piranha (which look remarkably like starfish to me), and finally on the seventh you must jump along an exceptionally long bridge which has built into it an alarming number of holes of differing lengths.

The whole game is maddeningly addictive, with each level presenting an annoying series of challenges. With high resolution graphics (and a number of sprites) used throughout, and a musical soundtrack that is useful while playing each level as well as being interesting to listen to, Aztec Challenge is one of the best of the new batch of games to appear for the Commodore 64.

So, on to Slinky. Remember Slinkies? Those wonderful toys that are impossible to describe to someone who's never seen one. Basically they are an extremely long spring made out of a highly pliable metal, but if you've never seen one there's no point going on.



Aztec Challenge: maddeningly addictive



Forbidden Forest: dedicated archery

The idea behind this disk-based game for the 64 is that you are in control of a Slinky, which has to leap about a maze of blocks. By leaping onto any one of the blocks you can change its colour, and when every block has been changed to the same colour, you can progress onto level two.

However (isn't there always a "however" in there somewhere?), Slinky's life is

occupied by a skull and crossbones, and the number of these increases as the game progresses. Needless to say, colliding with one of them is not a good idea.

Other squares are inhabited by a number of flags, and while bumping into these will give you an additional set of bonus points, it will also decrease the number of squares you can walk over, so a little bit of strategy comes into it all.

Booted

Finally, the other inhabitant of the grid is known as the big boot. This boot roams about the place, without any sense of purpose at first but with a remarkable homing instict as the levels get more difficult. Just one boot to begin with, but surviving four three levels will have the maximum number of four boots chasing after you.

Collide with a boot, and some nice graphics sees you literally 'booted' off the screen.

There are nine pre-selectable levels at which you can start the action, although the game will progress to 'infinity', according to the instruction card. Since computer magazine deadlines are considerably shorter than the life of the universe we couldn't test this claim.

The game can be played with either a joystick or the keyboard, and a nice touch allows you to select which keys you want to play with if you go for the latter option. Other praiseworthy features include a constant display of high score and all the other points of interest, the ability to turn the irritating background tune on or off, a pause feature, and a self demonstration mode just to let you get the hang of everything.

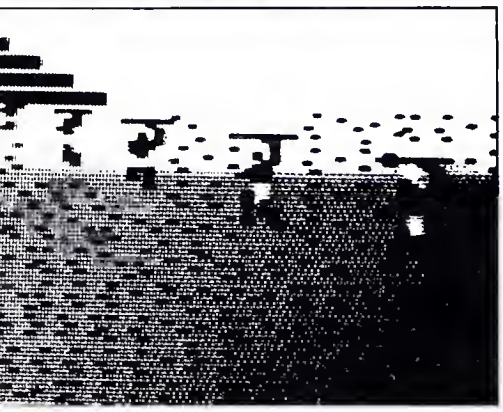
All told, a competent piece of programming that is not the best game you'll ever see on the 64, but one that is certainly far, far removed from being the worst. Well worth seeking out.

Software Projects, the company formed out of the royalties earned on the original Spectrum version of Manic Miner, have now put out the 64 version of the same program, along with a number of other games for the Vic 20, of which more later.

When annoying Interceptor Micros in the March issue by telling everyone who wanted a version of Manic Miner for the 64 not to buy their China Miner, but rather to wait for the translation of the original, I was harbouring fond thoughts of just how good the translation could be.

Halted

More memory to play with, better graphics facilities, and an infinitely better sound capability, all held rich promise for the shape of things to come. After all, if the Spectrum version was so good, surely the 64 version would be . . . exactly the same, unfortunately or at least that's the way of it on the first five levels. ▶



made just that little bit more difficult by a series of 'meanies' that leap about the blocks as well. Drops of water, clouds of evil-looking brown gunge, and others, all float about the place as well, and if one of them manages to collide with the Slinky then that's the end of one of your lives.

Successfully completing a level brings you to one of the longest gaps between game levels I've ever come across. Flags wave, bullets fly, tunes play cheerfully in the background, and you could easily give up in boredom before you ever get to see level two. I'm all in favour of good use of graphics and sound, but there are limits.

On level two, there are the same 'meanies' flying around everywhere, but this time there is an added difficulty. Jumping onto a block changes it's colour as before, but if you jump onto a block a second time it reverts back to its original colour. Thus a little bit of strategy has to be used as well as mere mad waving about of the joystick, in order to complete the task of changing the colour of all 54 blocks.

Some of the blocks hold hidden bonuses, some hold extremely large holes which Slinkies are prone to falling down, and the game as a whole is quite fun to play. But they should do something about the gap between levels (irritating) and the amount of time it takes to start up a new game after all your lives have been lost, which takes up so much time that it transcends mere irritation and becomes downright annoying.

From the same American company that supplied the previous two Audiogenic packages (Cosmi Incorporated) comes Forbidden Forest. It is also written by the same programmer, and in this game (even more so than with Slinky) some of the delays between levels and new games are so long that you begin to wonder if anything is ever going to happen.

But still, enough of gripes and complaints, what about the plot?

Being a dedicated archer, you wander out into the middle of the screen to do a little archery practice in the heart of the old forest. But, as night falls, the moon comes out, and strange creatures rustle about in the undergrowth around you, you realise that you've made the same mistake that befalls all games players. You've wandered into the Forbidden Forest, where anything can, and will, happen.

In procession you get attacked by giant spiders, an enormous bumble bee, some huge leaping frogs that look very unlike frogs, a fire breathing dragon, a ghostly apparition that is protected by a series of demented killer skeletons, an 80 foot long snake, and finally a ghostly demogorgon (that's what it says!), who only appears during flashes of lightning.

Pressing the fire button on the joystick once will load the bow, and pressing it again will fire an arrow in whatever direction you happen to be pointing in at the time. Delay too long, and the relevant monster will destroy you in a blood-curdling display of hi-res graphics.

With some lovely scrolling displays, and excellent use of high resolution graphics and sprites, there isn't a lot that you can fault about this game.

I just wish the programmer would let the player get on with the action, instead of making him/her sit there in sheer boredom at a dancing sprite while a merry tune plays in the background. Fun the first time, but annoying after a while.

Still, this is a game that I can certainly envisage coming back to, and if a game's addictive enough to make you want to play it again and again, what else can you say?

At £12.95 all three of these disk games are expensive, although you can get cheaper versions on cassette. The games don't use the disk drive as anything other than a storage medium (ie there's no file access going on, and there's no updating of the disk), so if you've got the patience you might as well get the cassette versions.

All three are good (although none of them gives you the option to play the game using the keyboard), and all three make excellent use of the features of the 64. If I had to pick a favourite it would be Aztec Challenge, but even this doesn't come up to the calibre of British games like Revenge of the Mutant Camels, surely the finest game yet written for the 64?

In short, a nice try, and one can only hope and wait for the finer games that are almost certainly still out there somewhere. ■

◀ Twenty levels to explore on this one, rather than the thirty-odd on the Spectrum, version, but on my copy of the program everything came to a grinding halt after level five.

We'll come back to that point in a moment, but for now, for the benefit of that tiny proportion of the population who won't know what all the fuss is about, the precis.

Miner Willy, prospecting around in Surbiton, suddenly finds an old, forgotten mine shaft. Going to investigate, he finds a lot of deserted mines, now inhabited only by the robots who were instructed to guard and excavate them. In each mineshaft there is a different set of robots, but there is also an assortment of treasures.

By gathering a number of keys in each mine, Miner Willy can progress to the next by a door located somewhere (usually pretty inaccessibly) on the screen.

So the idea of the game is to go around collecting goodies, and avoiding all the nasties that get in the way, including of course the robots.

These robots take on some pretty weird forms, like dodos, toilet seats, giant Eurgene Evanses and so on. By using either the keyboard or the joystick, Miner Willy must jump about the place and generally try to explore everything like a good miner should.

However, my copy of the program refused to go beyond level five (Eugene's Lair), since past that point everything appeared as a black screen with a flashing door in the middle. No obstacles to avoid, no keys to collect, in fact nothing other than a door and a miner.

Assuming that this isn't the case with most copies of the program, if you don't mind looking at a Spectrum-sized screen on a Commodore 64 (yes, even that's been shrunk to the same size as the original), this is an excellent product that should sell in healthy numbers.

Drained

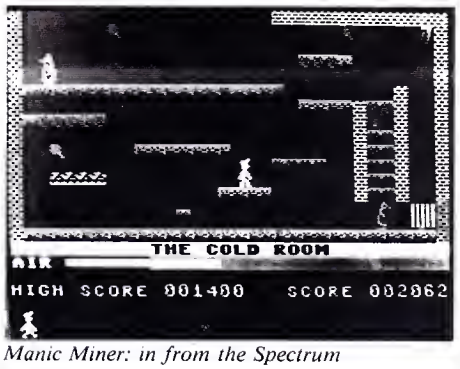
Right then, enough of the 64, what's the Vic been doing lately?

The first of two £7.95 programs for the unexpanded Vic 20 from Sumlock Microware, there appears to be no apparent reason why this one is called Multitron and the next one Triad, since each name could happily be transferred from one game to the other.

Still, this is only a little Vic, and one mustn't be too harsh on it, so assuming that we're stuck with the name Multitron, what is it all about?

Nothing new, I'm afraid, since we start the game in the traditional starfighter battle cruiser, as usual equipped with the latest and most advanced defence system known to man.

In this case, our starfighter comes complete with one laser cannon. Using either the keyboard or a joystick our trusty cruiser can be manoeouvered either left or right along the bottom of the screen, and apart from that the only other control is a fire button to unleash the deadly cannon.



Manic Miner: in from the Spectrum

The amount of cannon fire at your disposal is indicated up at the top left hand corner of the screen. Continuous fire drains the energy of the device, and you'll have to wait while all the energy cells recharge before you can fire again.

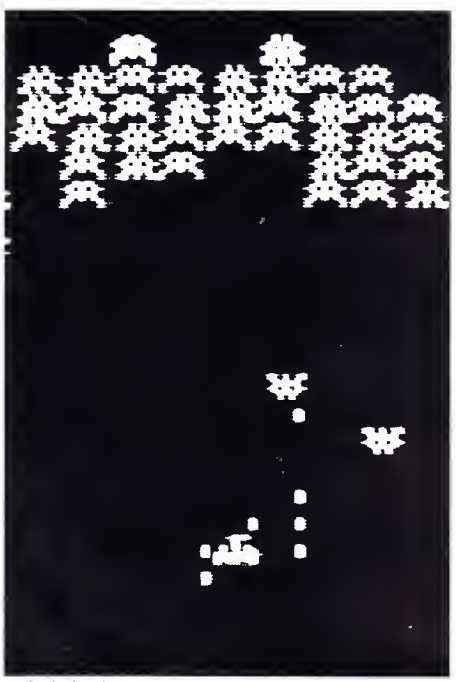
Meanwhile, you're a sitting starfighter for whatever wave of little aliens are after you this time.

In all there are six different sets of aliens after you, ranging from cosmic phoenixes (sounds like a souped-up star from Coronation Street) to space turtles, warp stingers to the meanies, and in between a shower of deadly tri-missiles between which you must bob and weave.

Surviving each wave of creatures (to say nothing of the deadly tri-missiles), takes you into a winding space corridor, which you have to trundle along for a while until the next set of nasties puts in an appearance.

Some of these nasties are really nasty, since they will sometimes stop moving about the screen when you fire at them, sit and wait for your missiles to blast harmlessly by, and then carry on moving again.

The choice of colours used to display everything could have done with a bit more thought, as some of the aliens and in particular their fire are rendered almost invisible at times, but I suppose a dedicated starfighter pilot has to get used to things like this.



Triad: look out, it's Pete

Quite a reasonable offering.

The second from Sumlock Microware for the unexpanded Vic is back on even more familiar territory than is Multitron, since Triad is a version of . . . OH NO!! Space Invaders!

Actually, it's closer to Galaxians than Space Invaders, but Galaxian doesn't seem to invoke the great sense of impending boredom that the mere saying of the words Space Invaders seems to.

As in all versions of the game, this Vic implementation sticks fairly rigidly to the rules, with a number of rows of little aliens all bobbing about the screen in strict formation. Periodically, some of them will peel off from the main group and come dive bombing down out of the sky at you, and your little starfighter (equipped with the latest blah blah blah) must move about the bottom of the screen and protect the universe by destroying the aliens before they can destroy you.

Stuck

Your ship can only move left or right, and it's no good getting stuck in a corner just because a couple of the meanies force you to start moving in that direction. Far better to have it out with them, and try and blast your way to safety, rather than relying on not getting picked off in the corner next time they come down, because you will almost surely meet the predestined fate of all Invader players, namely an untimely demise.

Having said all that, this version of the program is better than most that I've seen, since it does stick fairly rigidly to the original game. If you're going to make a copy of an arcade game you might as well do so religiously. Taking liberties with the original story will probably only make it worse, since it was presumably a success in the arcades becasue of the way it was written in the first place.

So, if you're going to own a copy of Galaxians for the unexpanded Vic 20, this is the best one I've come across.

It's the same old game as usual, but it's been very well implemented, with some lovely graphics and sound, so if you've got to get one copy (just for old times sake), you might as well make it this one.

From the same company that brought us the delights of Manic Miner for the Commodore 64, Software Projects have now gone onto other arenas and come up with Space Joust for the unexpanded Vic 20.

It's nice to see people sticking to the machine in its unexpanded form. If you do have memory expansion, you can always remove it, but games that require an additional 16K or whatever are hard to play if you can only muster a miserable 3.5K of memory.

Space Joust is unusual, there is no doubt about that, although the story line starts off in despairingly familiar style.

You are about to embark on a mission to save the universe and everything it stands for (this is a good idea?!) by going out to destroy a few waves of enemy

spacecraft.

Being the space hero that you are, you've been chosen to fly this mission single handed, so there's no two player option. All control is handled by the joystick, with no chance of playing via the keyboard, but as I would imagine that most dedicated games players have joysticks by now, this shouldn't present any problems to most people.

Destroyed

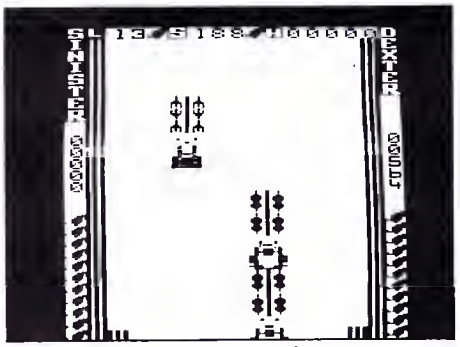
The game has a number of different levels built in, and on starting up on the first screen you see your spaceship sitting serenely on top of some kind of platform. Unfortunately, it looks more like an Cadbury's Creme Egg than a spaceship, but it still works.

However, the enemy spacecraft look remarkably like yours, and it will probably take a couple of games to actually sort out what is happening.

To destroy the enemy you don't fire laser cannons at them, nothing so crude as that, in this game you have to bounce on top of them. Since they can do the same to you and thus wipe you out this requires a fair degree of manual dexterity, but the first few screens aren't too difficult.

About the only thing that changes as the levels progress is the background scenery (nothing to write home about), and the speed with which the enemy craft bounce about the place.

Nothing brilliant, and not a game I could envisage coming back to at a later date.



Chariot Race: Charl-ton, Charl-ton

Back to ancient times once more, as the scene changes from the depths of space to the roman amphithetre, and the great chariot races that used to take place there.

For all you Charlton Heston lovers, Chariot Race from Micro-Antics ('exceptional software' they claim, and for once this is no idle boast) gives you the chance to be the big macho chariot driver, and pound everyone off the track for only £6.95.

With the choice of either a one or a two player game, this one relies on the keyboard for control, rather than a joystick for one player and the keyboard for another.

This means that you have to stand rather close to your adversary in a two player game, and in the heat of battle who knows what might happen?

The game starts with two chariots at the bottom of the screen, drawn in superb style, with one driver called Sinister and the other called Dexter. As you start off, the horses begin to gallop, and it becomes obvious that someone has spent a lot of time on this program. The graphics are just superb, and it really is hard to convince yourself that this is an unexpanded Vic.

Enemy chariots, controlled by the Vic, come down the screen as you catch up with them, and the object of the game is to keep going for as long as possible, pushing the other chariots into the side of the track for bonus points as you go along.

Barged

Move too slowly, and the finicky crowd gets upset and starts throwing fireballs onto the track.

After you've scored a certain number of points, or you're nearing the end of the required 20 laps, the Vic chariots stop being passive runners and start to barge you out of the way, and from then on you'll need a cool hand on the reins in order to stay alive.

A great game, that I would recommend anyone to buy. The Gerrard team of games testers voted three to one in favour of this being the best game they'd seen for the unexpanded Vic. What else can you say: buy it!■

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5/84 64/Commodore Horizons

Data basics

***Mike Watts** gets down to data bases*

DO YOU HAVE a large stamp or record collection, a library of reference books or a club with a long list of members?

Do you need to maintain records of staff, stock, suppliers, customers or a thousand and one other things?

A Data Base is a way of maintaining records like this with a minimum of fuss.

Think of a Data Base as a series of card index cards, each one, called a "record", holding complete details of a particular item or person. Each separate section of this card will then contain a separate piece of information, called a "field", relating to the record. The data base management system is a more or less simple program to maintain, alter, update, sort, index and retrieve information from the data stored in the data base.

Unlike a card index system, where it is only possible to sort the records into order by a single field, the computerised data base is usually able to retrieve information from several fields at a time. For example, let's consider a large collection of LP records. The owner could store them in alphabetical order of artist's name, or alphabetical order of publishing company. He could easily keep a card index with a separate card for each record showing the titles of the various tracks. He might even classify each record, soul, heavy metal, jazz, R & B, rock, blues and so on.

The one thing he can not easily do from his card index, when it is sorted in order by artist's name, is produce a list of all the rock music tracks in his collection published by a particular company.

In circumstances like these a well thought out computerised data base can be the next best thing to sliced bread. It is worth emphasizing though that only the most powerful systems permit alterations to be made to the structure once data is present.

Time spent in designing the records and their structure is well spent. I have been looking at three recently released data base management systems for the Commodore 64.

In testing all three of these systems I used a simple data base structure to set up a file containing details of some of my own LP record collection. This contained details of the artist, record producer, category, and the title of each track. All three of the programs on test store information on disk as separate records. Speed of accessing the information held within these records varied considerably, and depended to some degree on the way in which the information required was called up.

The first item on the agenda, after the design stage, is, in each case, to load the program and format a data disk. All three programs provide a utility to handle this without aggravation. Superbase also uses the data disk for storage of help screens and some other information. In all three cases the set-up procedure stores some index information on the disk, so I would advise that you make use of the built in facilities.

Easy-File (£75) from Commodore is supplied in Vicsoft's usual sturdy cardboard box which contains two program diskettes and a substantial, well written manual. As its name implies, Easy-File is a simple program, designed with the less experienced user in mind. Perhaps it should be thought of as a file manipulation program rather than a data base. It is rather restrictive in the amount of information that it can store, and will not support non-Commodore printers or the CBM 1520 printer plotter.

Like most things connected with the 1541 disk drive, storage and retrieval of information is a long winded process. However, this is slightly compensated for in Easy-File by its quite powerful sort facility. The user is able to sort records into order using three separate keys, in my case alphabetical order of artist's name, producer's name and category. Screen handling is abysmally slow.

A request from the user to 'Find a string' in a specified field is handled reasonably quickly. On the other hand 'Find a string' in any field seems to take forever.

Some arithmetic facilities are offered, and report generation facilities are quite good for a simple program of this type.

Infodisk 64 (£75), from Beaver Software Systems in Melton Mowbray, is supplied on a double sided Memorex disk, with sample data and six sample applications on the label side, and the programms themselves on the reverse.

The manual, contained in a plastic ring binder, is fairly comprehensive and contains an excellent index produced from one of the sample applications supplied. Unfortunately I found the rest of the manual to be somewhat condescending, sometimes difficult reading and most of the time downright annoying in its approach. Perhaps the style would be more acceptable to a novice user but I feel that a well conceived and well executed program which, if only on price, is obviously aimed at the computer literate end user, deserves to be supported by good documentation.

Beaver Software Systems supply only one, protected, program disk, making back-up impossible. They are prepared to replace faulty disks free within two months of purchase, but will charge £10 for this between two and six months and £20 after six months from purchase, or if there is evidence of mechanical damage. Whilst this, to me unacceptable, approach may be understandable, their insistence that faulty disks be returned to them prior to replacement will undoubtedly lead to postal delays and so on.

	Superbase	*Infodisk*	*Easyfile*
Max size recrd(Chrs)	1108	2400	506
Max No Fields.	127	180	80
Max size field.	255		38
Max No Screens/Rec	4	9	2
Calc. on field.	Yes	Yes	Yes
Calc on record.	Yes	Yes	Yes
Calc. Across recrd	Yes	Yes	No
Password protect.	No	No	Good
Search by Field.	Yes	No	Yes
Record.	Yes	No	Yes
Sort by key.	Yes	Yes	Yes (3)
Max No. Sort keys	1	1	3
Indexing.	Yes	Yes	No
File Compression.		No	Yes
Report Facilities.	Good	Yes	Good
Batch Processing.	Yes	Yes	No
Menu driven.	Yes	Yes	Yes
Disk Utilities.	Yes	Yes	Yes
Instruction Manual	Good	Patchy	Good
Mods to structure.	Yes	No	No

Commodore 64 data base systems check list

Generating

Each record in Infodisk is able to hold up to 2400 characters, in up to 180 fields. Record capacity is limited only by disk size, multiple files can be kept on disk.

Report generation facilities are generally very comprehensive. Using any of the information in the files, reports can be output either to the screen or a suitable printer in either page, linear or tabulated form. Report formats can be saved to disk.

Selected data can be output in a Wordpro compatible sequential format (for instance for merging into a wordprocessing program to produce statements, invoices and so on).

Up to 50 pre-defined calculations are permitted in each file using any of 19 functions

(arithmetic, relational, logical, etc) allowing calculations either on individual records or in batches.

Beaver Software Systems tell me that they will soon be releasing a version on tape. The data produced by both programs will be transferable between versions, and between machines running the programs.

Expensive

Superbase 64 from Precision Software, at £99.95, is the most expensive of the three programs on test. Supplied in a plastic ring binder with two program disks (one for back-up, to be kept somewhere safe) and an extremely well written, comprehensive manual.

Like Infodisk, the manual has an excellent index; but unlike Infodisk the style is thoroughly professional without, in my view, being incomprehensible to the new user.

Unlike many so called Data Base Management programs, Superbase is able to support up to 15 files in each data base. The program is generally user friendly being menu-driven with excellent "goof-proofing".

The user is able to define records, set up separate files and even link them, retrieve records and generally manipulate data.

One of the most powerful features of Superbase is its programming option, which permits the more experience user to produce applications packages using the 40 commands in the Superbase programming language. User defined programs have a maximum of 4k to work in, but chaining is possible.

Using the integral disk formatting program to set up data disks will transfer the help screens onto the disk, saving memory. From my brief acquaintance with Superbase it seems that, unlike most similar programs, the perpetual swapping of disks in the 1541 drive has been almost eliminated.

This is the first truly professional database that I have come across for the CBM 64. Precision Software has obviously spent a great deal of time and effort in its production. The authors of the program have, between them, years of experience in a wide range of hardware from main frames down. This experience is reflected in the excellent screen presentation.

Perhaps the other reason for my enthusiasm for this product is its similarity to dBASE II (perhaps the definitive commercial data base). I am told that development of Superbase took place at about the same time as dBASE.

Precision Software was unique in being able to assist me with using the Commodore 1520 plotter. I found the company willing and able to spend time discussing the program and am sure that it would do everything possible to help end users.

All three of these programs are, in their own way, well thought out and written packages for the Commodore 64.

Easy-File is an easy to use file maintenance utility which may well be suitable for many home users, my major criticism of it is the extremely slow screen handling. It is all too easy to type ahead of the program and waste time recovering from such mistakes. Not a program for the business user and, in my view, somewhat overpriced.

Infodisk 64 is an attempt to produce a powerful data base management program in such a way as to be ultra user-friendly. Whilst it is undoubtedly quite powerful, with unlimited field size (within a maximum record length of 2400 characters), I was put off by the documentation. For the price it probably represents good value, but I can not support Beaver Software Systems attitude to the supply of replacement program disks.

Super

Superbase 64 is by far the best thing that I have come across in a long time for the CBM 64. It even (almost) makes using the 1541 drive acceptable. Screen handling is fast and flexible, as is report generation. Precision Software supplies a facility to customise the program to many different printers and would, I am sure, be able to suggest solutions to any problems that may arise. I found them thoroughly helpful.

Like any tool, Superbase must be learnt before it will give of its best. For the user prepared to spend time on this learning phase, it will be extremely good value. Similar commercial programs, running on CP/M machines, cost up to three times as much. ■

Write your own machine code adventures

Without any knowledge of machine code whatsoever

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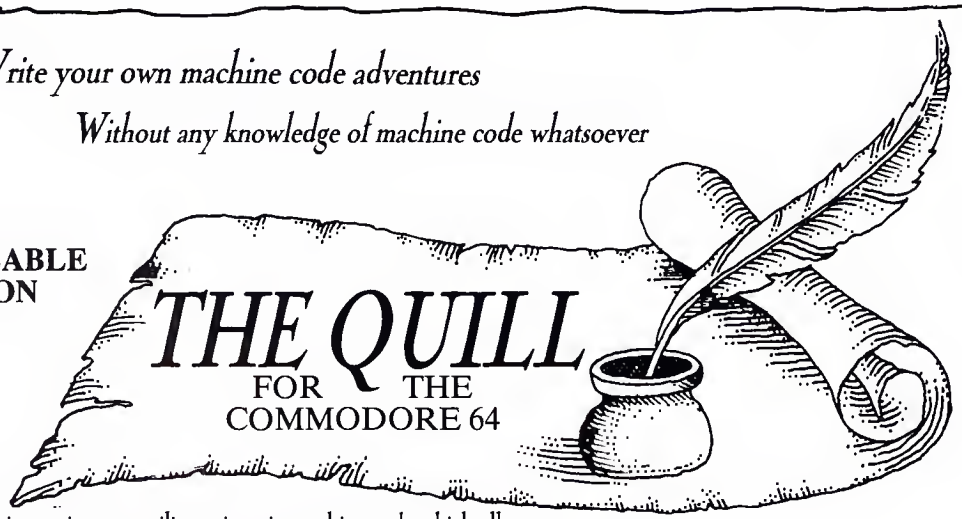

THE QUILL

FOR THE COMMODORE 64

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Hungary for an original game

Andromeda Software's David Bishop tells ***Chris Jenkins*** *the plans for an Eastern games invasion*

ONE OF THE greatest faults with the UK software industry — a fault inherited from the American scene — is the slavish imitation of arcade games. How many versions have you seen of old favourites like Defender, Pac-Man, Space Invaders, Caterpillar — and so on? It's understandable that a software author should choose to copy arcade games: firstly, it saves him the effort of thinking up original play patterns and characters; secondly, it means that the game has been proven on the battleground of the arcades, and therefore carries some assurance of commercial success.

It's rare, therefore, to find truly original computer games, free of the arcade influence — but Andromeda Software has managed to do it, by recruiting programmers from a market which has never been exposed to the concept of the games arcade.

David Bishop explained how Andromeda was developed. "I started off working for Vulcan Electronics, which basically existed to import and distribute chess computers. The managing director, Robert Stein, realised early on that the home computer would become a commodity which could be successfully marketed through non-specialist shops. Vulcan started up a number of concessions in department stores, and moved on to become hardware distributors for Commodore UK. This was the start of a relationship with Commodore which is still very important to us in Andromeda."

David went on to explain how the work of Vulcan Electronics in the field of hardware distribution led to an understanding of the demands of the software market. "Vulcan is now concentrating on the distribution of hardware like joystick interfaces and joysticks, and we're looking at the possibilities of several lines like microdisk drives. I now concentrate entirely on Andromeda Software, which was set up partly at the instigation of CBM. It was clear to Robert Stein that there was a great potential source of software available in Hungary, and that although it wouldn't be sensible to try to compete with the established distributors, it would be practical to develop software then license it to the various software houses."

Having already formed business connections with Hungary through the distribution of chess computers, Robert knew that there were many programmers who could be made interested in games work. He explained: "All Hungarian business software has to be written in Hungary, as ▶

David Bishop: Eastern eye

their business methods are unique. This means that there were many skilled programmers available who had never been exposed to arcade games — because there aren't any in Hungary!"

Although such computers as the Commodore 64 are available in Hungary, they are too expensive for domestic use. "Robert found," David continued, "that some Hungarians had purchased computers while abroad, and the most popular choice was the Commodore 64. There was therefore some knowledge of the capabilities of the machine, though it will be at least two years before the market penetration in Hungary is enough to justify the distribution of games software there."

Competition

From November 1982, Andromeda Software began to stimulate interest in games design amongst Hungarian programmers, and attracted games ideas by running a competition through television advertising. "We had about 1,500 ideas submitted to us, in all kinds of formats. Some came in as sketches, some as complete storyboards. We narrowed these ideas down to three strings, and we're still developing the ideas from the first string — so there's plenty of material left for development, and interest in Hungary is still being stimulated by advertising and competitions."

The remaining problem was to adapt the ideas received into playable games. David continued "We matched up games ideas with the programmers we thought were best suited to develop them. The problem was that although they had plenty of technical skill, they weren't familiar with the requirements of playability — so most of the development work we do is based on the adaptation of a good idea into a good game. The development process needs three elements: the idea, the programmer, and the game designer. We're trying to find games designers both within and out of Hungary, and we're being well supported by Commodore itself and other software houses. Apart from established UK games designers, we're negotiating with the Rubik games design studio, and offering hardware support for its development work."

Cubes

I asked Robert Stein, himself Hungarian, what aspects of the Hungarian character are revealed in the games ideas. "It's odd that the idea of Hungary doesn't automatically generate any associations in the British mind. But there's more to Hungary than carburettors, cubes and holograms — there's a rich folk tradition which has manifested itself in several forms in the software we're developing. For instance, in the game Save Me Brave Knight, which is going to be released by Commodore, we have a mediaeval setting with a knight rescuing a maiden. In other games we see little features which are typical of the Hungarian sense of humour — in Ocean's Chinese Juggler the little man jumps up and down when he completes a screen, and in Commodore's Dancing Monster we have the ridiculous dancing creature with the elephant's trunk.

"Also typical of Hungarian software is a unique charm, and a great attention to detail in the graphics. Look for instance at Mirrorsoft's Caesar the Cat — there are over 50 frames of animation used to draw the moving cat, and the charm of the character is irresistible."

David Bishop explained more about the process of marketing the games. "Once we've developed the idea to a storyboard stage, and the games designers have worked out some of the play details, we can start to negotiate with the software houses. At this stage there is an element of the auction about the proceedings, since we entertain various offers and can look for the best deal. That doesn't necessarily mean we just go for the biggest cash offer; we try to match each game with a software house which we feel is professional, has good distribution and, most importantly, is committed to the game itself.

"For instance, one space adventure game we were developing was so liked by Personal Software Services that their representatives approached us at a trade fair and showed us ready-designed posters and promotional literature for the game — well, if they wanted it that badly, who were we to say no! That's going to be marketed as Quark, and PSS is also doing Bathtime, which is a great game for younger players. We like to make sure that our games are going to be well supported. It's a pity that Dancing Monster, which is a very good game, isn't being pushed harder by Commodore — but it's quite understandable. After all, they're in the hardware business primarily, and rarely spend much time in promoting their software."

Complexity

David's knowledge of the software market helps him in the development of the games. He liaises between the UK software houses and the Hungarian programmers, who are now organised into teams with specialists available for consultation on particular projects. "For instance, we have a 3D expert, Gabor Meresz, who has developed a 3D billiards game which is astonishingly realistic. He's always called in when one of the teams need advice in this particular area." The dozens of pages of data needed to specify the 3D routine in Spatial Billiards indicates the complexity of the work needed.

The attention to detail shown in the design of graphics means that for the first time, arguably, the whole visual capability of the CBM 64 is being used in games like Chinese Juggler. Here a combination of user-defined graphics, sprites and

Playing cat and mouse with David Bishop

imaginative use of colour add up to something remarkably original and entertaining. You control the juggler whose task it is to balance plates on poles, and keep them spinning by returning at intervals to the rods and shaking them. Programmer Ivan Balazs is a graduate chemist whose career is in mainframe programming, mainly on probability and simulation work. He first used a home computer in 1983, and collaborated on Chinese Juggler with Emese Rovny, an artist and housewife.

Catchy

Ivan's brother Oscar Balazs, a professor of music, was also involved. His interest in electronic music found an outlet in writing the maddeningly catchy tunes for Chinese Juggler and other games. Caesar the Cat also has remarkable music, consisting of a sclection of Hungarian folk tunes — it certainly makes a change from endless variations on Bach's Toccata and Fugue, or the Death March, which seems to be all there is on offer on other games. On those games the music rapidly becomes boring, and it's a blessing if you're allowed an option to switch it off. On the Hungarian games, the music is an integral part of the charm of the programs.

Although confidence in Atari has recently been dented by poor market performances, Andromeda Software is also involved in the field of games cartridges for home video games systems. For CBS/Colecovision it's developing a version of Soccer which is radicaly different to CBM's version. "It displays the interesting points of the action on a split-screen, and pays more attention to the full rules of the game. Unfortunately it's unlikely to be adapted for the 64, since it would be in competition with CBM's game — but it will give a good idea of the capabilities of our programmers. We've also been discussing adapting Atari games for Parker; but nothing's really been decided. At the moment the systems we have most confidence in are Commodore's and Sinclair's, so we concentrate on them."

So Andromeda's role as developers of original software leaves it free to concentrate on the quality of the game, leaving the marketing and distribution to the software houses. "Once we've made a deal for rights to a game," David explained, "we wouldn't show the game to any other houses. Our other rule is that we don't automatically give world-wide rights to one company — for instance, Dancing Monster is marketed in the USA by Quicksilva, not CBM. We try to choose the house with the best distribution set-up and marketing plans for each country. You must remember that the market is very variable: the costs of computers and software, the market penetration and the state of development of the market changes from country to country."

At the moment around 180 people are working on Andromeda programs. Liaison with Hungary is maintained by fortnightly visits by either David Bishop or Robert Stein — in fact, Robert was flying to Dusseldorf that evening for a conference. Eighteen programs are in a finished state, and by the end of the year there should be around 42. Although many of the games I saw were in a pre-production state, all seemed to have considerable potential.

Catastrophe

One notable game is provisionally entitled Catastrophe. A complex and fast-moving scenario features helicopters duelling to build the tallest possible building in the shortest possible time. The drawback is that natural disasters such as floods, earthquakes and typhoons destroy your building as it's being assembled. The game features excellent sound effects and a typical attention to detail.

Save Me Brave Knight is a multi-screen mediaeval adventure, in which your mounted knight must brave the perils of a magnificently realised fortress in order to save his fair maiden. Again, the quality and detail of the 3D graphics are remarkable.

Mazerunner features a cute puppy racing around a maze, facing problems of two kinds: intellectual puzzles which have to be solved, and evil monsters which have to be zapped. "We thought of having two versions of this game," commented David, "one for pre-school users and one for more advanced players."

Excalibur is an idea created from a few rough sketches of a vast interlocking maze of platforms and ladders, shown again in 3D. "Here I added the idea of King Arthur and the search for the sword," explained David. "Often that's what's needed — a concept around which to base the original idea. The other thing we must get across to our programmers is the concept of the multi-screen game. An idea has to be very, very good these days if it's to limit itself to one screen, and although some of our games, like Caesar the Cat, are single screen, we prefer to work on multi-screen ideas. We could always give some of our programmers a sack full of 10p pieces and turn them loose in an arcade off Leicester Square — but we'd rather keep their ideas fresh!"

Clearly Andromeda will be coming up with a lot more interesting and refreshingly original games in the near future. One set of story boards concerns a canoe race down a set of rapids. "The idea of that one was that the player should actually feel sea-sick while playing the game!"

David Bishop is leaving Andromeda to form his own public relations company, but will continue his association with Andromeda as its PR representative. "It's a fascinating company, because nobody else operates in quite the same way. Andromeda is creating a business out of the individual efforts of many talented people." ■

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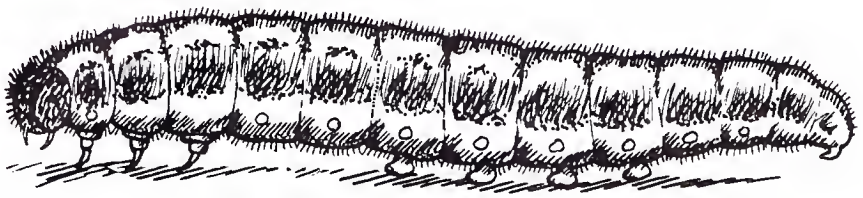
***Steven Brain** makes a meal of games programming*



FRED GOES EAT-ABOUT demonstrates how you can write an arcade type game entirely in Basic. The idea of the game is to help Fred the hungry caterpillar eat all the food on each sheet, using a joystick (in port 2) or user-defined keys. Colliding with your own tail is fatal, and hitting the sides decreases your limited supply of food, but points are clocked up all the time you stay alive. Food also decreases continuously with time, and both the rates at which the score increases and the food decreases are linked to the skill level you've reached. The penalty for hitting the border and the amount of food per block are also affected by the skill level. The current skill level is indicated in two ways — first of all by the colour of the backgrounds, and secondly by a character from A onwards on the status line. The game terminates when you run out of food, go off the upper or lower limits of the screen, or run into your own tail. The termination displays tell you whether you've beaten the hi-score.

The title screen displays the hi-score and allows you to select certain options. Sound can be turned on or off (SOUND (Y/N)), but remember that if the CPU is sounding off then you can't move at the same time so things slow down. KEYBOARD(K) or JOYSTICK(J) may be selected, and if you are going to use the keys you can select whichever you find convenient (CHANGE KEY DEFINITIONS (RETURN)).

ON GOTO statements are used to jump to the relevant control routine, and to jump over the sound control lines, depending on the values of variables which can be changed during the title screen. The keys for the relevant directions are stored in strings, so that they can also be changed by selecting the key definition option of the title screen.

Since the Commodore does not produce a clear picture with all combinations of foreground and background colours, this has also been accounted for by READing a series of suitable background colours from a DATA statement containing the colours that produce a good display in combination with black (as most of the display is black). The values for the initial setting up of the sound are also held in DATA statements, and the pulsating sound is produced by switching the volume on and off during the program.

To aid the user I have enclosed all control characters in the listings in square brackets, and produced a table showing all control characters used in the program and how to obtain them. If there is a number in the square brackets this means the character must be repeated that number of times.

[CLR]	SHIFT-CLR/HOME
[CD]	DOWN CURSOR
[CR]	RIGHT CURSOR
[WHITE]	CONTROL-2
[BLACK]	CONTROL-1
[HOME]	CLR/HOME
[RYS ON]	CONTROL-RVS ON
[SHIFT Z]	SHIFT-Z
[SHIFT Q]	SHIFT-Q
[CBM B]	COMMODORE LOGO KEY-B

Now on to the program itself, starting with the set-up routine. Line 1 GOSUBs to a routine which initialises the sound parameters, KEYBOARD/JOYSTICK flag (X) and the initial hi-score (HS).

```
1 GOSUB 60000:X=2:HS=500
```

To prevent foreground (mostly black) and background clashes the colours which mix well with black are held in a DATA statement which is terminated by −1.

```
60000 DATA 1,3,4,5,7,11,12,13,14,15,-1
```

The DATA for the sound settings is held in a DATA statement containing the address to be POKEd and the value to POKE it with.

```
60100 DATA 54296, 0, 54276, 65, 54277, 16, 54278, 0, 54272, 169, 54273, 72, 54289, 0, 54288, 1.
```

First of all, the data pointer must be moved to the end of the background colour DATA (this may not seem very logical until you realise that the background DATA is used repeatedly, but sound DATA only once).

```
60010 FOR N=1 TO 11:READ CH:NEXT N
```

Next the sound DATA is READ and POKEd into place.

```
60110 FOR N=1 TO 8
60120 READ AD,CH
60130 POKE AD,CH
60140 NEXT N
```

The program then RETURNs to the start of the program.

```
60150 RETURN
```

Finally the title screen is called.

```
5 GOSUB 30000
```

The title screen is formatted entirely with control characters embedded in PRINT statements. The only exception is that line 30000 POKEs locations 53280 and 53281. This is done to set the border and background colours to black.

```
30000 PRINT "[CLR][WHITE][2 CR][33 SHIFT Z]": POKE 53280,0: POKE 53281,0
30010 PRINT "[2 CR][SHIFT Z] FRED GOES EAT-ABOUT BY S. BRAIN [SHIFT Z]"
30015 PRINT "[CLR][WHITE][2 CR][33 SHIFT Z]"
30020 PRINT "[CD][2 CR]GUIDE FRED THE HUNGRY CATERPILLAR"
30030 PRINT "[CD]AROUND THE SCREEN IN SEARCH OF FOOD ([SHIFT Q])"
30040 PRINT "[CD][CR] WHILE STEERING CLEAR OF THE BORDERS ([CBM B])
30050 PRINT "[CD][6 CR]AND NOT EATING YOUR OWN TAIL([SHIFT Z])"
30060 PRINT "[CD][11 CR]HI-SCORE IS "; HS
30070 PRINT "[2 CD][7 CR]JOYSTICK (J) OR KEYBOARD(K)"
30080 PRINT "[CD][14 CR] SOUND (Y/N)"
30090 PRINT "[CD][4 CR] CHANGE KEY DEFINITIONS(RETURN)"
30100 PRINT "[2 CD][7 CR]PRESS SPACE TO START"
```

A feature of the title screen is that it allows you to select various options which affect the game.

Line 30110 scans the keyboard and puts the result into K$. It then checks if the joystick option has been chosen. If it has been chosen X is set to 1 ready for the program.

```
30110 GET K$:IF K$="J" THEN X=1
```

Line 30120 sets X to 2 (default value) if the keyboard (K) option is chosen.

```
30120 IF K$="K" THEN X=2
```

If you press the space bar the program RETURNs from the title screen and the game starts.

```
30130 IF K$=" " THEN RETURN
```

If you press Y the program accepts this as request to keep the sound on, so S is set to 0 (the default value).

```
30140 IF K$="Y" THEN S=0
```

If you press N the sound is turned off by setting S to 1.

```
30150 IF K$="N" THEN S=1
```

If you press return, then the program jumps to the key definition routine at 30300.

```
30160 IF K$=CHR$(13) THEN 30300
11100 GOTO 1100
```

As the joystick produces different numbers according to it's position, it is necessary to correct these so that a movement of one position is obtained in each direction. Line 20 sets these correction values (K1 = left, K2 = right, K3 = up, and K4 = down).

```
20 K1=4:K2=8:K3=1:K4=2
```

```
1 GOSUB 60000:X=2:HS=500
2 K1$="Q":K2$="E":K3$=";":K4$="/"
5 GOSUB 30000
10 SS=1024:CR=55296:RESTORE:READ BG:BK=1:SC=0
20 K1=4:K2=8:K3=1:K4=2:BK=1
100 PRINT "■□"
110 FOR N=CR TO CR+999
120 POKE N,0
130 NEXT
140 POKE 53280,BG-1:POKE 53281,BG
150 P=RND(1)*38+41:LK=2:LP=P:A$=K4$:FO=200
200 FOR N=0 TO 39
210 POKE SS+N,160
220 POKE SS+40+N,255
230 POKE SS+960+N,255
240 NEXT N
250 FOR N=40 TO 920 STEP 40
260 POKE SS+N,255
270 POKE SS+N+39,255
280 NEXT N
290 PRINT "■□■■■SCORE:■■■■■■■■■■SHEET:■■■■FOOD:";FO
300 NF=RND(1)*15+5
310 FOR N=1 TO NF
320 FP=RND(1)*839+121:POKE SS+FP,81:POKE CR+FP,BG-1
330 NEXT N
1000 ON X GOTO 10000,11000
1100 IF PEEK(SS+P)<>32 THEN 2000
1110 IF P<0 OR P>999 THEN 50000
1120 IF FO<0 THEN 50000
1200 POKE SS+P,90
1210 ON S GOTO 1300
1220 POKE 54296,15
1230 POKE 54296,0
1300 FO=FO-BK
1310 SC=SC+BK
1400 PRINT "■□■■■■■■■■■■";SC;"     "
1410 PRINT "■□■■■■■■■■■■■■■■■■■■■■■■■■■■";CHR$(BK+64)
1420 PRINT "■□■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■";FO
1500 GOTO 1000
2000 IF PEEK(SS+P)=81 THEN 2100
2010 IF PEEK(SS+P)=255 THEN 2200
2020 GOTO 50000
2100 FO=FO+(255-BK):NF=NF-1:IF NF<2 THEN 40000
2110 GOTO 1110
2200 FO=FO-BK*2
2210 GOTO 1110
10000 JV=15-(PEEK(56320) AND 15)
10010 IF JV<>0 THEN LP=P:LK=JP:JP=JV
10050 IF JP=K1 THEN P=P-1:GOTO 10100
10060 IF JP=K2 THEN P=P+1:GOTO 10100
10070 IF JP=K3 THEN P=P-40:GOTO 10100
10080 IF JP=K4 THEN P=P+40:GOTO 10100
10090 P=LP:JP=LK:GOTO 10050
10100 GOTO 1100
11000 GET K$:IF K$<>"" THEN LK$=A$:LP=P:A$=K$
11050 IF A$=K1$ THEN P=P-1:GOTO 11100
11060 IF A$=K2$ THEN P=P+1:GOTO 11100
11070 IF A$=K3$ THEN P=P-40:GOTO 11100
11080 IF A$=K4$ THEN P=P+40:GOTO 10100
11090 P=LP:A$=LK$:GOTO 11050
11100 GOTO 1100
20000 READ BK
30000 PRINT"□■■◆◆◆
```

◀ The Joystick Value (JV) for the joystick is found by the formula
JV = 15 – (PEEK(56320)AND15)

Line 10010 then checks to see if JV <> 0 and if so makes Last Position (LP) equal to Position (P), Last joystick position (LK) equal to Joystick Position (JP), and Joystick Position (JP) equal to Joystick Value (JV).

```
10000 JV = 15 – (PEEK(56320) AND 15)
10010 IF JV<>0 THEN LP = P:LK = JP:JP = JV
```

Lines 10050-10080 compare the Joystick Position (JP) with the different directions (K1, K2, K3, and K4) and P is updated according to the direction.

```
10050 IF JP = K1 THEN P = P – 1:GOTO 10100
10060 IF JP = K2 THEN P = P + 1:GOTO 10100
10070 IF JP = K3 THEN P = P – 40:GOTO 10100
10080 IF JP = K4 THEN P = P + 49:GOTO 10100
```

Line 10090 is only reached if the joystick result does not correspond to a direction. It sets Position (P) to Last Position (LP) and Joystick Position (JP) to Last Joystick Position (LK) before jumping back for retesting at 10050. This means that Fred continues in the same direction until you select another direction.

```
10090 P = LP:JP = LK:GOTO 10050
```

Finally 10100 jumps back into the main program loop at 1100.

```
10100 GOTO 1100
```

Lines 100-140 set up the screen for the game itself.

```
100 PRINT "[BLACK][CLR]"
110 FOR N = CR TO CR + 999
120 POKE N,0
130 NEXT N
140 POKE 53280,BG – 1:POKE 53281, BG
```

Line 150 sets the position Fred starts from as a random position along the top row of the screen. Last Joystick value (LK) is set to K4, to ensure Fred is moving down at the start of the game, and A$ is set to K4$ for the same reason. Last Position (LP) is set to P and the food allowance set to 200.

```
150 P = RND(1)*38 + 41:LK = K4:A$ = K4$:LP = P:FO = 200
```

Lines 200-280 draw ther border.

```
200 FOR N = 0 TO 39
210 POKE SS + N,169
220 POKE SS + 40 + N,255
230 POKE SS + 960 + N,255
240 NEXT N
```

```
250 FOR N = 40 TO 930 STEP 40
260 POKE SS + N,255
270 POKE SS + N + 39,255
280 NEXT N
```

Line 290 PRINTs the status labels along the top of the screen.

```
290 PRINT "[HOME][RVS ON][3 CR] SCORE:[10 CR]SHEET:[4 CR] FOOD: ";FO
```

Line 300 selects the amount of food to be placed on the screen.

```
300 NF = RND(1)*15 + 5
```

Lines 310 to 330 place that food at random positions on the screen.

```
310 FOR N = 1 TO NF
320 FP = RND(1)*839 + 121:POKE SS + FP, 81:POKE CR + FP,BG – 1
330 NEXT N
```

Now on to the main program loop. Line 1000 ON GOTOs the relevant routine to update Fred's position (P) according to whether joystick or keys were selected.

```
1000 ON X GOTO 10000,11000
```

Line 1100 checks to see if Fred has run into any obstacles (next position not a space (CHR$(32)).

```
1100 IF PEEK(SS + P)<>32 THEN 2000
```

Line 1110 checks to see if Fred has wandered off the screen.

```
1110 IF P<0 OR P>999 THEN 50000
```

Line 1120 checks to see whether you've run out of food.

```
1120 IF FO<0 THEN 50000
```

Line 1200 POKEs Fred into his new position on the screen.

```
1200 POKE SS + P,90
```

Line 1210 jumps over the sound routine if you selected to turn the sound off (S = 1).

```
1210 ON S GOTO 1300
```

Line 1220 POKEs the volume to 15 and then line 1230 POKEs it back to 0.

```
1220 POKE 54296,15
1230 POKE 54296,0
```

Fred's food is decremented by the skill level while his score is incremented by the same value.

```
1300 FO = FO – BK
1310 SC = SC + BK
```

Lines 1400-1420 update the score, skill level, and food level displays.

```
1400 PRINT "[HOME][RVS ON][10 CR]";SC;" "
```

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CH5/84

```
30060 PRINT "■■■■■■■■■■■■■HI-SCORE IS ";HS
30070 PRINT "■■■■■■■■■■JOYSTICK(J) OR KEYS(K)"
30080 PRINT "■■■■■■■■■■■■■■■■■SOUND (Y/N)"
30090 PRINT "■■■■■CHANGE KEY DEFINITIONS (RETURN)"
30100 PRINT "■■■■■■■■■■PRESS SPACE TO START"
30110 GET K$:IF K$="J" THEN X=1
30120 IF K$="K"THEN X=2
30130 IF K$=" " THEN RETURN
30140 IF K$="Y"THEN S=0
30150 IF K$="N" THEN S=1
30160 IF K$=CHR$(13) THEN 30300
30200 GOTO 30110
30300 PRINT"■■■■■■■■■■■■■■■■LEFT=";:GOSUB30400:K1$=K$
30310 PRINT"■■■■■■■■■■■■■■■■RIGHT=";:GOSUB30400:K2$=K$
30320 PRINT"■■■■■■■■■■■■■■■■UP=";:GOSUB30400:K3$=K$
30330 PRINT"■■■■■■■■■■■■■■■■DOWN=";:GOSUB30400:K4$=K$
30340 GOTO 30000
30400 GET K$:IF K$="" THEN 30400
30410 PRINT K$
30420 RETURN
40000 READ BG:BK=BK+1
40010 IF BG>-1 THEN 100
40020 RESTORE:READ BG
40030 GOTO 100
50000 PRINT "■■■■■■■■■■■■■■■■":POKE 53280,0:POKE 53281,0
50010 PRINT"■■■■■■■■■YOU WERE PREMATURELY ZAPPED"
50020 IF SC>HS THEN 51000
50030 PRINT "■THAT WASN'T BAD BUT YOU DIDN'T BEAT THE■■■■■■■■■■ HI-SCORE OF ";HS
50040 PRINT "■■■■■■■■■YOUR SCORE WAS ";SC
50050 FOR N=1 TO 5000:NEXT N:GOTO 5
51000 PRINT "■WELL DONE, YOU BEAT THE OLD HI-SCORE BY ■■■■■■■■■■■■■■■■■";SC-HS
51010 FOR N=1 TO 5000:NEXT N:HS=SC:GOTO 5
60000 DATA 1,3,4,5,7,11,12,13,14,15,-1
60010 FOR N=1 TO 11:READCH:NEXT
60100 DATA 54296,0,54276,65,54277,16,54278,0,54272,169,54273,72,54289,0,54288,1
60110 FOR N=1 TO 8
60120 READ AD,CH
60130 POKE AD,CH
60140 NEXT N
60150 RETURN
```

1410 PRINT "[HOME][RVS ON][26 CR] ";CHR$ (BK + 64)
1420 PRINT "[HOME][RVS ON][35 CR] ";FO

Line 1500 loops back for the next move to line 1000.

1500 GOTO 1000

The next section deals with collisions.

Line 2000 detects whether the object Fred hit was food (screen code 81).

2000 IF PEEK(SS + P) = 81 THEN 2100

Line 2010 detects whether Fred hit the border (screen code 255).

2010 IF PEEK(SS + P) = 255 THEN 2200

If Fred didn't hit the borders or food, he must be off the screen or have eaten himself, so the program goes to line 5000 (the end game routine).

2020 GOTO 50000

The screen is cleared upon termination and the border and background colours set to black.

50000 PRINT "[CLR][WHITE][10 CD]": POKE
53280,0:POKE 53281,0

The message "YOU WERE PREMATURELY ZAPPED" appears, and a test is made to see if you beat the hi-score. If you did beat the previous hi-score the program jumps to line 51000.

50010 PRINT "[8 CR] YOU WERE PREMATURELY ZAPPED"
50020 IF SC>HS THEN 51000

A message appears telling you by how much you beat the hi-score. After a short delay the program jumps back to line 5.

51000 PRINT "[CD]WELL DONE, YOU BEAT THE OLD HI-SCORE BY[CD][15 CR]";SC-HS
51010 FOR N = 1 TO 5000;NEXT N:HS = SC:GOTO 5

Fred's food

If you failed to improve on your performance a suitable message appears, and a timing loop is executed before the program jumps back to line 5.

50030 PRINT "[CD]THAT WASN'T BAD BUT YOU DIDN'T BEAT THE[CD][9 CR] HI-SCORE OF ";HS
50040 PRINT "[CD][8 CR]YOUR SCORE WAS ";SC
50050 FOR N = 1 TO 5000:NEXT N: GOTO 5

Line 2100 adds (255 minus the skill level) to Fred's food reserve, the amount of food left is decremented, and a check is made to see if Fred has eaten all the food on the current screen. (NF must be less than 2, rather than 1, as you could have started on top of a piece of food!).

2100 FO = FO + (255 − BK):NF = NF − 1:IF NF<2 THEN 40000

As long as there is still food on the screen, line 2110 jumps back into the main program loop at 1110.

2110 GOTO 1110

If the current screen is cleared then the next BackGround (BG) colour is READ out of the DATA statement at 60000 and the skill level (BK) is incremented by 1.

40000 READ BG:BK = BK + 1

If the end of DATA marker (− 1), which has been added to the end of the list of background colours, has not been reached, then the program loops back to line 100 which redraws the new screen.

40010 IF BG> − 1 THEN 100

If it has been reached, then the DATA is RESTOREd and the original BackGround colour is READ again, but the skill level still rises.

40020 RESTORE: READ BG
40030 GOTO 100

When Fred crashes into the borders his food reserve must decrement so FO is decremented by BK*2. Line 2210 then jumps back into the main program loop at 1110.

2200 FO = FO − BK*2
2210 GOTO 1110

Hopefully, from these notes and a close study of the complete program listing, you'll be able to pick up some tips which should help you to improve your own games programming skills. ■

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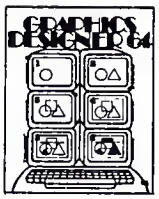

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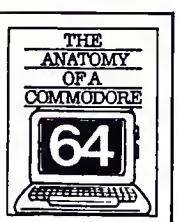

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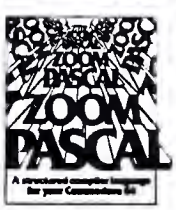

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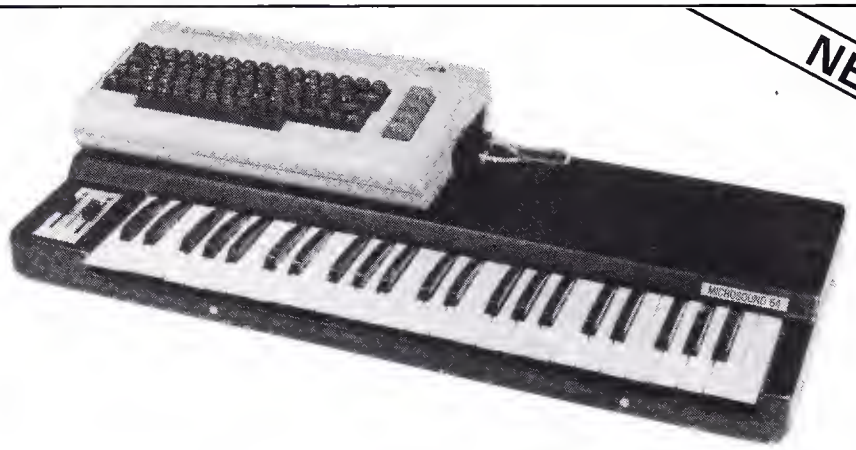

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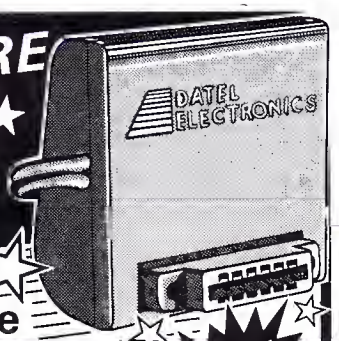

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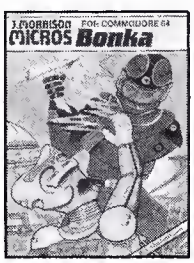

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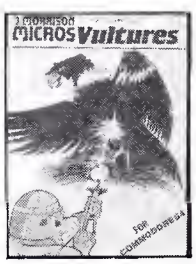

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For these reasons it is standard practice to use a machine code "monitor" program, often combined with an "assembler", which allows the codes and addresses used in the machine language program to be displayed on the screen.

In the early days of personal computing the only machine language monitors available were likely to be in Basic, but as they were considered to be slow, cumbersome and space-consuming (which they were!) they quickly gave way to machine-code monitors such as Supermon (and later Extramon) in the CBM machines. However, the proliferation of different machines now means that different versions are required for the three Basics in the Pets, as well as different Basics in the Vic 20, CBM 64, CBM 700 etc. This proliferation can be confusing and frustrating — for instance Extramon is widely available for the Pets but only Supermon for the C-64.

Look-alike

Starting with the Basic assembler/disassembler given in Raeto West's 'bible' *Programming the PET/CBM* I decided to write a Basic 'look-alike' to Supermon which incorporated some of the features of Extramon and would run on *any* CBM machine, and should adapt quickly to any other 6502 machine (such as BBC, Apple, Oric etc). Basic assemblers/disassemblers can be written to optimise on speed and their slowness is only relative to the lightning speed of machine code: the example to be presented here will disassemble each instruction to the screen (CBM 4032) at a rate of around 135 instructions per minute, so each instruction takes about 0.44 secs. Assembly

```
          8ASICMON/1    8Y M.C.HART

 1 CLR:GOTO2000
 100 L=L/4096:PRINT"$";:FORJ=1TO4:L%=L:PRINTCHR$(48+L%-(L%>9)*7);:L=16*(L-L%):NEX
T:RETURN
 200 L=L/16:FORJ=1TO2:L%=L:PRINTCHR$(48+L%-(L%>9)*7);:L=16*(L-L%):NEXT:RETURN
 250 L$="":L=L/16:FORJ=1TO2:L%=L:L$=L$+CHR$(48+L%-(L%>9)*7):L=16*(L-L%):NEXT
 251 RETURN
 300 L=0:FORJ=1TO4:L%=ASC(MIO$(L$,J)):L=16*L+L%-48+(L%>64)*7:NEXT:RETURN
 350 L=0:FORJ=1TO2:L%=ASC(MID$(L$,J)):L=16*L+L%-48+(L%>64)*7:NEXT:RETURN
 400 FORK=2TO1STEP-1:L=PEEK(CA+K):OOSU8200:NEXT:RETURN
 500 L=PEEK(CA+1):PRINT"$";:OOSU8 200:RETURN
 600 PRINT"($";:OOSU8400:PRINT")":RETURN
 610 GOSU8500:PRINT",Y"
 620 PRINT"(";:OOSU8500:PRINT",X)":RETURN
 630 PRINT"(";:OOSU8500:PRINT"),Y":RETURN
 640 L=PEEK(CA+1):IFL>127THENL=L-256
 642 L=CA+2+L:GOSU8 100:PRINT:RETURN
 650 GOSU8400:PRINT",Y":RETURN
 660 PRINT"#";:GOSU8500:PRINT:RETURN
 670 OOSU8400:PRINT",X":RETURN
 680 OOSU8500:PRINT",X":RETURN
 690 GOSU8500:PRINT:RETURN
 700 GOSU8400:PRINT:RETURN
 710 PRINT:RETURN
 800 L=LEN(AS$)
 805 IFL=3THENM=11:RETURN
 810 IF L=7THENM=9:RETURN
 814 FF=0:IF MID$(AS$,5,1)="*" ANDL=8 THEN M=4:FF=1:RETURN
 815 IFL=8THENM=6:RETURN
 820 L$=MIO$(AS$,9,1)
 825 IF L$="X"THENM=8:RETURN
 830 IF L$="Y"THENM=1:RETURN
 835 IF L$=","THENM=2:RETURN
 840 IF L$=")"THEN M=3:RETURN
 845 L$=RIGHT$(AS$,1)
 850 IF L$="X"ANDL=11THENM=7:RETURN
 855 IF L$="Y"ANDL=11THENM=5:RETURN
 860 IF L$=")"ANDL=11THENM=0:RETURN
 865 IFLEFT$(AS$,1)="8"AND MID$(AS$,2,1)<>"I"THENM=4:RETURN
 870 IFL=9THENM=10:RETURN
 875 PRINT"MODE ?":M=12:RETURN
 900 P=7:L=4:OOSU8960:RETURN
 905 P=5:L=2:OOTO 960
 910 P=7:L=2:OOTO 960
 915 P=7:L=2:GOTO 960
 916 P=7:L=2:OOSU8960:OOSU8 350:RETURN
 920 P=8:L=4:GOSU8 960:GOSU8 300
 921 L=L-CA-2:IFL>127ORL<-128THENPRINT"8RANCH?":M=12:RETURN
 922 IF L<0 THEN L=L+256
 923 RETURN
 925 P=6:L=4:GOTO960
 930 P=7:L=2:GOTO960
 935 P=6:L=4:GOTO960
 940 P=6:L=2:OOTO960
 945 P=6:L=2:GOTO960
 950 P=6:L=4:GOTO960
 960 L$=MID$(AS$,P,L):RETURN
1900 L$=E$:GOSU8300:E=L
2000 OIM OP$(255),M%(255):SP$="
2010 FORJ=0TO150
2020 REAO OP,OP$(OP),M%(OP)
2030 NEXT
2040 K8=623:NC=158:CH=16:X=PEEK(57345):REM 8ASIC 4
2050 IF X=160 THEN K8=527:NC=525:CH=3:REM 8ASIC 1
```

is slower, but this would be true in any case since much assembly work is interactive: here the assembly takes between 1-2 seconds per instruction. The 'HUNT' function which searches for specified bytes or strings is the slowest of all, but even here the search of 1K of memory takes about 30 seconds. The advantages of the Basic assembler/disassembler is that I have a version which will run equally well on the 4032 and C-64 that I have at home or the Basic 2 machines available at work.

This assembler/disassembler works entirely in hex, to make it as near as possible to both Supermon and Extramon, but in addition a CONVERT function is incorporated to facilitate easy conversion from decimal to hex and back again. Most experienced machine code programmers tend to work entirely in hex in any case. Inputs generally assume hex and the user may enter the required with or without the preceding '$'.

The rather esoteric numbering reflects the fact that Raeto West's published program provided the basis upon which the rest of the program was built. Interested readers could consult West in case of difficulty to see the original/disassembler whilst the refinements have been built around the original.

There follows a list of the commands available in Basicmon, and an explanation of their functions.

ASSEMBLE — this is a 'simple' assembler, so no provision is made for labels. The assembler uses string lengths to deduce the addressing mode and these are therefore critical. The programmer can make forward or backward jumps to start or re-enter code and this is useful to correct (evident) errors.

To overcome the problems of commas in input lines, for example LDA $28,X the program pokes a quote mark into the keyboard buffer. Lines 2040-2080 identify the CBM machine in order to poke the correct locations. In addition, poking CH with a non-zero number prevents the null INPUT crash.

If you do not have a CBM machine and do not have the INPUT LINE function then you may replace the , by a ; on assembly and remove everything before INPUT in line 4015.

Valid

The assembler will accept valid assembly instructions, bytes separated by spaces if preceded by BYT, for instance BYT 41 42 43, and ASCII text if preceded by TXT, for instance TXT RUN.

The PRINT CHR$(7) in line 4015 tinkles the chime on the 4032.

DISASSEMBLE — this provides output options for the screen or printer. Start and end addresses should be specified.

MEMORY — this gives bytes in groups of eight together with ASCII equivalents. This therefore incorporates the INTEROGATE command in Extramon and is useful for identifying keywords or tables of messages. Output may be to the screen or printer.

TRANSFER — does a 'straight' transfer of bytes from one section of memory to

```
2060 IF X=72 THEN K8=623:NC=158:CH=14:REM 8ASIC 2 9"
2070 IF X=127 THEN K8=623:NC=158:CH=16:REM 8ASIC 4 9"
2080 IF X=220 OR X=86 THEN K8=631:NC=198:CH=19:REM VIC20/C64
2090 POKE CH,1
2100 PRINT"[CLR]":PRINT:PRINT:PRINT"                8ASICMON"
2110 PRINT"                 ========[DOWN][DOWN][DOWN][DOWN]"
2115 PRINT"             8Y M. C. HART"
2116 PRINT"                 -------------[DOWN][DOWN][DOWN][DOWN][DOWN][DOWN]"
2120 INPUT"[RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT]INSTRUCTIONS
(Y/N)? ";A$:PRINT
2130 AA$=LEFT$(A$,1)
2140 IF AA$="Y"THENPRINT:GOTO6000
2150 IF AA$="N"THENPRINT:GOTO2500
2160 PRINT"[UP]";SP$:PRINT"[UP]";:GOTO2120
2500 PRINT:POKECH,1
2510 PRINT"[RVS]A[RVSOFF]SSEMBLE  [RVS]D[RVSOFF]ISASSEMBLE  [RVS]M[RVSOFF]EMORY
 [RVS]T[RVSOFF]RANSFER"
2520 PRINT:PRINT"[RVS]C[RVSOFF]ONVERT  [RVS]S[RVSOFF]AVE  [RVS]L[RVSOFF]OAD  I
RVS]H[RVSOFF]UNT  [RVS]F[RVSOFF]ILL  [RVS]G[RVSOFF]O"
2530 PRINT:PRINT"[RVS]I[RVSOFF]NSTRUCTIONS  [RVS]E[RVSOFF]ND  ";
2540 INPUT"[RVS]CHOICE IS[RVSOFF]? ";L$:PRINT
2550 IFLEFT$(L$,1)="A"THEN4000
2560 IFLEFT$(L$,1)="D"THEN3000
2570 IFLEFT$(L$,1)="M"THEN3500
2580 IFLEFT$(L$,1)="T"THEN4200
2590 IFLEFT$(L$,1)="I"THEN6000
2600 IFLEFT$(L$,1)="C"THEN2800
2610 IFLEFT$(L$,1)="S"THEN4700
2620 IFLEFT$(L$,1)="L"THEN4500
2630 IFLEFT$(L$,1)="H"THEN3700
2640 IFLEFT$(L$,1)="G"THEN2900
2650 IFLEFT$(L$,1)="F"THEN4400
2660 IF L$="E"OR L$="END"THEN PRINT:PRINT"-END-":POKECH,0:END
2670 PRINTCHR$(147);:GOTO2510
2800 REM CONVERT
2810 PRINT:INPUT"CONVERT? ";L$:PRINT
2820 IF ASC(L$)<>36THENL=VAL(L$):PRINTL$;"= ";:GOSU8100:PRINT:GOTO2500
2830 PRINTL$"= ";:L$=MID$(L$,2):GOSU8300:PRINTL:GOTO2500
2900 REM MACHINE CODE
2910 PRINT:INPUT"RUN CODE FROM (HEX)? ";L$:PRINT
2920 IF ASC(L$)=36 THEN L$=MID$(L$,2)
2930 GOSU8300:SYS(L)
2940 GOTO 2500
3000 PRINT:INPUT"DISASSEMBLE FROM,TO (HEX)? ";L$,E$:PRINT
3001 IF ASC(L$)=36THEN L$=MID$(L$,2)
3002 IF ASC(E$)=36THEN E$=MID$(E$,2)
3003 IF LEN(L$)<4ORLEN(E$)<4THENPRINT:PRINT"NOT 4 FIG HEX":GOTO3000
3005 GOSU8 300:CA=L:L$=E$:GOSU8300:EL=L
3007 PRINT:INPUT"DEVICE # (3=SCREEN,4=PRINTER)? ";N:PRINT:PRINT
3008 IF N<3 OR N>4 THEN N=3
3009 OPENN+128,N:CMDN+128,;
3010 L=CA:GOSU8100:PRINTLEFT$(SP$,7-LEN(STR$(CA)));CA;
3015 P=PEEK(CA):M=M%(P)
3020 IF OP$(P)<>""THEN 3025
3022 L=P:PRINT"  ";:GOSU8200:PRINT"          ???":NB=1:GOTO3065
3025 NB=2:IF M=0 OR M=5 OR M=7 OR M=10 THEN NB=3
3030 IF M=11 THEN NB=1
3035 PRINT"  ";
3040 FORK=0TO NB-1
3045 L=PEEK(CA+K):GOSU8 200:PRINT" ";
3050 NEXT
3055 FORJ=NB TO 3:PRINT"   ";:NEXT:PRINTOP$(P)" ";
3056 IF N8=3 AND PEEK(CA)<>108 THEN PRINT"$";
3060 ON M+1 GOSU8 600,610,620,630,640,650,660,670,680,690,700,710
3065 CA=CA+NB
3066 CLOSEN+128
3070 GET L$:IF L$="" "THEN 2500
3071 IF L$="D"THEN3000
3072 IF L$="A"THEN4000
3073 IF L$="M"THEN3500
3075 IFCA<=ELTHEN 3009
3076 GOTO2500
3500 PRINT:INPUT"MEMORY    FROM,TO (HEX)? ";L$,E$:PRINT
3510 IF ASC(L$)=36THEN L$=MID$(L$,2)
3520 IF ASC(E$)=36THEN E$=MID$(E$,2)
3525 IFLEN(L$)<4ORLEN(E$)<4THENPRINT:PRINT"NOT 4 FIG HEX":GOTO3500
3530 GOSU8 300:CA=L:L$=E$:GOSU8300:EL=L
3540 PRINT:INPUT"DEVICE # (3=SCREEN,4=PRINTER)? ";N:PRINT:PRINT
3545 IF N<3 OR N>4 THEN N=3
3550 OPENN+129,N:CMDN+128,;
3560 L=CA:GOSU8100:PRINT" ";
3570 FORI=0TO7:L=PEEK(CA+I):GOSU8200:PRINT" ";:NEXTI
3580 PRINT"[RVS]";:FORI=0TO7:L=(PEEK(CA+I)):IFL>127THENL=L-128
3590 IF L<32THENL=46
3600 PRINTCHR$(L);:NEXTI:PRINT
3610 CA=CA+8
3620 CLOSE N+128
3630 GET L$:IF L$="" "THEN 2500
3640 IF L$="D"THEN3000
3650 IF L$="A"THEN4000
3660 IF L$="M"THEN3500
3670 IFCA<=ELTHEN 3550
3680 GOTO2500
3700 REM HUNT
3710 PRINT:INPUT"SEARCH FOR? ";A$:PRINT
3720 W=0:C=0:IF ASC(A$)<>39 THEN SH$=A$:GOTO3770
3730 W=1:A$=MID$(A$,2):SH$=""
3740 FORK=1TOLEN(A$):L=ASC(MID$(A$,K)):GOSU8250:SH$=SH$+L$
```

another. A check is made for 'overlap' of the code to be transferred and the new locations to ensure a correct transfer. The new location end address will be computed and displayed after the transfer.

CONVERT — enters a routine to undertake hex to decimal conversion and vice versa. If the number if preceded by a $ prefix then the hex to decimal routine is entered. The absence of a $ prefix will be taken to imply a decimal number and the decimal-hex routine entered.

Files

SAVE — gives the options of saving either to disk or tape. The programmer will need to be aware of the start and end addresses of the routine to be saved (which is generally a machine code routine) and to supply a file name for identification when prompted.

A sequential file is written which requires the LOAD option on this package to read it back again. However those with C-64 and disks can also create a PROGRAM file which can be loaded directly with a LOAD (filename), 8,1 command.

The following one liner will read in the sequential file created for tape if you do not wish to load the whole assembler. 1 OPEN 1: INPUT #/ 1,S,E:FOR J = S TO E:INPUT #/ 1,X$:POKE J, VAL (X$): NEXT:CLOSE1

LOAD — as with SAVE, this command gives the option of loading from disk or from tape. The filename of the routine needs to be specified.

If a DOS WEDGE is in operation it may not be possible to load from tape. The solution however is simple — switch out the DOS WEDGE before loading from tape.

HUNT — searches may be made within a specified range for ASCII strings, which should be tagged with an apostrophe e.g. 'PRINT, or patterns of bytes e.g. A9 05 A5 28.

The HUNT command reconstructs the specified ASCII string as a string of the relevant bytes and seeks a match on the first character. If not found, the search proceeds to the end of the specified range. If successful then a check is made of the other characters in the string and, if successful, the location of the start of the string in memory is displayed. If the sought pattern is not found in the specified range a message will indicate 'not found' at the end of the search.

As searches may be fairly long in BASIC it is possible to abort the search with an X which will bring the search to an end.

FILL — fills the specified range with a character of the user's choice. This is useful for 'blocking out' a section of memory before over-writing with machine code.

GO — will execute a machine code subroutine once the entry point is specified and then return to the menu.

INSTRUCTIONS — four pages of instructions are given which can themselves be called from the menu to refresh the user's memory.

END — exits from the program which may be 'warm-started' again with a 'GOTO

```
3750 IF K<LEN(A$)THEN SH$=SH$+" "
3760 NEXT K
3770 PRINT
3780 INPUT"SEARCH FROM,TO (HEX)? ";S$,E$:PRINT
3790 PRINT:FL=0:IF ASC(S$)=36THENS$=MID$(S$,2)
3800 L$=S$:GOSUB300:S=L
3810 IF ASC(E$)=36THENE$=MID$(E$,2)
3820 L$=E$:GOSUB300:E=L
3830 L$=MID$(SH$,1,2):GOSUB350:SH=L
3840 FORK=S TO E
3850 IF PEEK(K)<>SH THEN 3900
3860 T$="":FORI=ITO(LEN(SH$)+1)/3:L=PEEK(K+I-1):IF W=1 AND L>128 THEN L=L-128
3870 GOSUB 250:T$=T$+L$:T$=T$+" "
3880 NEXT I:T$=MID$(T$,1,LEN(T$)-1)
3890 IF T$=SH$ THEN L=K:GOSUB 100:PRINT" ";:FL=1:C=C+1:IF C=6 THEN C=0:PRINT
3900 GET Z$:IF Z$="X"THENPRINT:PRINT"ABORTING HUNT...":PRINT:K=E
3910 NEXT K
3920 IF FL=0 THEN PRINT:PRINT"--   ";A$;" NOT FOUND"
3930 PRINT:PRINT:PRINT "--   END OF HUNT FROM ";"$";S$;"-";"$";E$;"   --":PRINT
3940 GOTO 2500
4000 PRINT:INPUT "ASSEMBLE FROM (HEX)? ";L$:PRINT:IFASC(L$)=36THENL$=MID$(L$,2)
4001 PRINT:IF LEN(L$)<4THENPRINT"NOT 4 FIG HEX":GOTO4000
4005 GOSUB 300:CA=L
4010 L=CA:GOSUB100;:PRINTTAB(B);CA;
4015 PRINTCHR$(7);:POKEKB,34:POKENC,1:INPUT" ";ASSEMBLER$
4016 IF ASC(AS$))=65THEN4019
4017 L$=AS$:IFASC(AS$)=36THENL$=MID$(L$,2)
4018 PRINT:GOTO4005
4019 IF LEFT$(AS$,3)="DIS"THEN3000
4020 IFAS$="END"THEN PRINT:GOTO 2500
4021 IF LEFT$(AS$,3)="MEM"THEN3500
4024 CO$=LEFT$(AS$,3):IF CO$<>"BYT"ANDCO$<>"TXT"THEN4032
4025 AS$=MID$(AS$,5):LL=LEN(AS$):IFCO$="TXT"THEN4029
4026 IF ASC(AS$)=36THENAS$=MID$(AS$,2)
4027 FORK=1TOLEN(AS$)STEP3:L$=MID$(AS$,K,2):GOSUB350:POKECA,L:CA=CA+1:NEXTK
4028 GOTO4030
4029 FORJ=1TOLEN(AS$):POKECA+J-1,ASC(MID$(AS$,J)):NEXT:CA=CA+J-1
4030 PRINT:PRINTTAB(30);"[UP]";"[RVS]";AS$:GOTO4010
4032 GOSUB 800:IF M=12 THEN 4010
4035 FOR J=0TO255
4040 IF CO$<>OP$(J)THENNEXT:PRINT"OPCODE?":GOTO4010
4045 IF M<>M%(J)THENJ=J+1:GOTO4040
4050 NB=2:IF M=0ORM=5 OR M=7 OR M=10 THEN NB=3
4055 IF M=11 THEN NB=1
4060 POKE CA,J:L1=L:L=J:PRINT TAB(30);:GOSUB200:IF FF<>1 THEN PRINT" ";:L=L1
4061 IFFF=1THENGOSUB916:PRINT TAB(30);" ";L$:POKECA+1,L:CA=CA+2:FF=0:GOTO4010
4065 IF NB=1 THEN 4100
4070 IF M=4 THEN GOSUB 920:IF M=12THEN 4010
4075 IF M=4 THEN POKE CA+1,L:GOSUB200:GOTO4100
4080 ON M+1 GOSUB 900,905,910,915,920,925,930,935,940,945,950
4085 IF NB=2 THEN GOSUB 350:POKECA+1,L:PRINTL$;:GOTO4100
4090 IF NB=3 THEN GOSUB 300:POKE CA+1,L-INT(L/256)*256:POKECA+2,L/256
4091 L1=L:L=L-INT(L/256)*256:GOSUB200
4092 L=L1/256:PRINT" ";:GOSUB200
4100 PRINT:CA=CA+NB:GOTO4010
4200 PRINT:INPUT"TRANSFER START,END (HEX)? ";L$,E$:PRINT
4210 IF ASC(L$)=36THEN L$=MID$(L$,2)
4220 IF ASC(E$)=36THEN E$=MID$(E$,2)
4225 IFLEN(L$)<4ORLEN(E$)<4THENPRINT:PRINT"NOT 4 FIG HEX":GOTO4200
4230 GOSUB 300:CA=L:L$=E$:GOSUB300:EL=L
4240 PRINT:INPUT"TRANSFER TO (HEX)? ";NL$:PRINT
4250 IFASC(NL$)=36THENNL$=MID$(NL$,2)
4260 NL=0:FORJ=1TO4:L%=ASC(MID$(NL$,J)):NL=16*NL+L%-48+(L%)64)*7:NEXT
4270 IF NL>CATHEN 4300
4280 FORJ=CA TO EL:X=PEEK(J):POKENL+J-CA,X:NEXTJ
4290 L=NL+EL-CA:GOTO4320
4300 FOR J=EL TO CA STEP -1:X=PEEK(J):POKENL+J-CA,X:NEXTJ
4310 L=NL+EL-CA
4320 PRINT:PRINT"[RVS]TRANSFERREO TO[RVSOFF] ";"$";NL$;"-";:GOSUB100:PRINT
4330 GOTO 2500
4400 REM FILL
4410 PRINT:INPUT"FILL FROM,TO (HEX)? ";S$,E$:PRINT
4420 IF ASC(S$)=36 THEN S$=MID$(S$,2)
4430 L$=S$:GOSUB300:S=L
4440 IF ASC(E$)=36 THEN E$=MID$(E$,2)
4450 L$=E$:GOSUB300:E=L
4460 PRINT:INPUT"FILL WITH (HEX)? ";A$:PRINT
4470 IF ASC(A$)=36 THEN A$=MID$(A$,2)
4480 L$=A$:GOSUB350:F=L
4490 FOR J=S TO E:POKE J,F:NEXT:GOTO2500
4500 REM LOAD
4510 PRINT:INPUT"LOAD FROM DISK OR TAPE (D OR T)? ";A$:PRINT
4520 OV=8:SA=2:IF LEFT$(A$,1)="T"THEN OV=1:SA=0
4530 IF OV>=8 THEN CLOSE15:OPEN15,8,15:PRINT#15,"I0":GOSUB 4900
4540 PRINT:INPUT"NAME OF FILE ";F$:PRINT
4550 IF F$=""AND OV>=8 THEN F$="DATAFILE"
4560 S$=F$:IF OV>=8 THEN S$="0:"+F$+",S,R"
4570 OPEN 2,OV,SA,S$:IF OV>=8 THEN GOSUB 4900
4580 INPUT#2,S,E
4590 IF OV>=8 THEN GOSUB 4900
4600 FORJ=S TO E:INPUT#2,X$:X=VAL(X$):POKEJ,X
4610 IF OV>=8 THEN GOSUB 4900
4620 NEXT J
4630 CLOSE 2:CLOSE15
4640 PRINT:PRINT:PRINT F$;" NOW READ INTO ";
4650 L=S:GOSUB100:PRINT"-";:L=E:GOSUB100:PRINT
4660 GOTO 2500
4700 REM SAVE
4710 PRINT:INPUT"SAVE TO DISK OR TAPE (D OR T)? ";A$:PRINT
```

2500'.

As it stands, the routine is best displayed on a machine with 40 columns or more, for instance the CBM 64 or Pet. It can be modified quite easily to work on a Vic 20 by cutting out the instructions and adapting the (rare) occasions when printing occurs on the same line after an INPUT statement. This principally occurs in line 4060 when the assembled code is displayed on the same line as the input of the assembler mnemonics.

Options

In the case of DISASSEMBLE and MEMORY an option is given to display on the screen or the printer. Each is regarded as a 'device' with the screen being device 3 and the printer device 4, but other users will have to be familiar with their own machines to the extent of writing their own code to switch from screen to printer. Similarly, the SAVE and LOAD routines will have to be adapted for different machines.

Even if the whole of the assembler is not implemented I am sure that interested users could learn quite a lot by studying some of the sub-routines, for instance the routines to convert to and from hex.

Some of these routines are listed here by line number, and readers may like to incorporate them into their own programs even if they do not implement the whole assembler.

Line 100: A 4-digit decimal-hex routine which prints out the result. L should contain the decimal number on entry.

Line 200: A 2-digit decimal-hex routine similar to the above.

Line 250: A 2 digit decimal-hex which returns the result in L$. Obviously this is easy to convert to the 4-figure case by changing the loop to: FOR J = 1 TO 4.

Lines 300-350: Hex-decimal routines to deal with 4-digit and 2-digit cases respectively. The number is entered in L$ and returned in L.

Lines 2040-2090: These lines identify the machine being used in order to set up certain parameters.
KB is the start of the keyboard buffer;
NC is the number of characters stored in the buffer;
CH is the file number of the current input/output device — when poked with a non-zero value it prevents the null INPUT crash on the PETS.
KB and NC are used to input the opening quote marks " automatically, so that the assembler can accept inputs complete with commas, such as LDA $8000,Y. Without such a device the comma would signal the end of one string, and the INPUT statement would complain with an EXTRA IGNORED message.

Lines 3009-3066: The disassembler is given the option of printing to either the screen or the printer. Here a file number of N (+128 to ensure line feed and carriage return on all printers) is opened to device 3 (= screen) or 4 (= printer). The CMD statement in line 3009 ensures that all print statements are directed to the appropriate 'output'. Opening files to the screen is useful for many purposes. this is yet

```
4720 OV=8:SA=2:IF LEFT$(A$,1)="T"THEN OV=1
4730 IF OV>=8 THEN OPEN15,8,15:PRINT#15,"I0":GOSUB 4900
4740 PRINT:INPUT"NAME OF FILE ";F$:PRINT
4750 IF F$=""AND OV>=8 THEN F$="DATAFILE"
4760 INPUT"START ADDRESS, END ADDRESS+1 (HEX) ";S$,E$:PRINT
4770 IF ASC(S$)=36 THEN S$=MID$(S$,2)
4780 IF ASC(E$)=36 THEN E$=MID$(E$,2)
4790 L$=S$:GOSUB8300:S=L
4800 L$=E$:GOSUB8300:E=L
4810 S$=F$:IF OV>=8THEN S$="@0:"+F$+",S,W"
4814 IF OV<8 THEN 4820
4815 PRINT:INPUT"FILE TYPE - SEQ OR PROG (S/P) ";FT$
4816 IF LEFT$(FT$,1)="P" THEN S$="@0:"+F$+",P,W"
4820 OPEN 2,DV,SA,S$:IF OV>=8 THEN GOSUB 4900:IF LEFT$(FT$,1)="P"THEN 4885
4830 CR$=CHR$(13)
4840 PRINT#2,S;",",E;CR$;
4850 IF DV>=8 THEN GOSUB 4900
4860 FORJ= S TO E:PRINT#2,STR$(PEEK(J));CR$;
4870 IF OV>=8THEN GOSUB4900
4880 NEXT J:GOTO 4890
4885 HI=INT(S/256):LO=S-256*HI:PRINT#2,CHR$(LO);CHR$(HI);
4886 FOR J= S TO E:PRINT#2,CHR$(PEEK(J));:GOSUB 4900:NEXTJ
4890 CLOSE2:PRINT:PRINTF$ " WRITTEN ":PRINT:GOTO2500
4900 REM READ ERROR CHANNEL
4910 INPUT#15,EN$,EM$,ET$,ES$:IFEN$="00"THEN RETURN
4920 PRINT:PRINT"[RVS]ERROR ON DISK"
4930 PRINT EM$,EN$,ET$;ES$
4940 CLOSE2:CLOSE15:END
5000 DATA 0,8RK,11,1,ORA,2,5,DRA,9,6,ASL,9,8,PHP,11,9,ORA,6,10,ASL,11
5010 DATA 13,ORA,10,14,ASL,10,16,8PL,4,17,ORA,3,21,ORA,8,22,ASL,8,24,CLC,11
5020 DATA 25,DRA,5,29,DRA,7,30,ASL,7,32,JSR,10,33,AND,2,36,8IT,9,37,AND,9
5030 DATA 38,ROL,9,40,PLP,11,41,AND,6,42,ROL,11,44,8IT,10,45,AND,10
5040 DATA 46,ROL,10,48,8MI,4,49,AND,3,53,AND,8,54,RDL,8,56,SEC,11,57,AND,S
5050 DATA 61,AND,7,62,RDL,7,64,RTI,11,65,EDR,2,69,EDR,9,70,LSR,9,72,PHA,11
5060 DATA 73,EOR,6,74,LSR,11,76,JMP,10,77,EDR,10,78,L9R,10,80,8VC,4
5070 DATA 81,EOR,3,85,EOR,8,86,LSR,8,88,CLI,11,89,EOR,5,93,EOR,7
5080 DATA 94,LSR,7,96,RTS,11,97,AOC,2,101,AOC,9,102,ROR,9,104,PLA,11
5090 DATA 105,ADC,6,106,ROR,11,108,JMP,0,109,AOC,10,110,RDR,10
5100 DATA 112,8VS,4,113,ADC,3,117,AOC,8,118,ROR,8,120,SEI,11,121,AOC,5
5110 DATA 125,ADC,7,126,ROR,7,129,STA,2,132,STY,9,133,STA,9,134,STX,9
5120 DATA 136,DEY,11,138,TXA,11,140,STY,10,141,STA,10,142,STX,10,144,8CC,4
5130 DATA 145,STA,3,148,STY,8,149,STA,8,150,STX,1,152,TYA,11,153,STA,5
5140 DATA 154,TXS,11,157,STA,7,160,LOY,6,161,LOA,2
5150 DATA 162,LOX,6,164,LDY,9,165,LOA,9,166,LDX,9,168,TAY,11
5160 DATA 169,LOA,6,170,TAX,11,172,LOY,10,173,LOA,10,174,LDX,10
5170 DATA 176,8CS,4,177,LOA,3,180,LDY,8,181,LOA,8,182,LDX,3,184,CLV,11
5180 DATA 185,LDA,5,186,TSX,11,188,LOY,7,189,LDA,7,190,LDX,5,192,CPY,6
5190 DATA 193,CMP,2,196,CPY,9,197,CMP,9,198,DEC,9,200,INY,11,201,CMP,6
5200 DATA 202,DEX,11,204,CPY,10,205,CMP,10,206,OEC,10,208,8NE,4,209,CMP,3
5210 DATA 213,CMP,8,214,OEC,8,216,CLD,11,217,CMP,5,221,CMP,7,222,OEC,7
5220 DATA 224,CPX,6,225,S8C,2,228,CPX,9,229,S8C,9,230,INC,9,232,INX,11
5230 DATA 233,S8C,6,234,NOP,11,236,CPX,10,237,S8C,10,238,INC,10,240,8EQ,4
5240 DATA 241,S8C,3,245,S8C,8,246,INC,8,248,SED,11
5250 DATA 249,S8C,5,253,S8C,7,254,INC,7
5260 :
5270 :
5280 :
6000 REM INSTRUCTIONS
6010 PRINT"[CLR]          INSTRUCTIONS   PAGE 1"
6020 PRINT"          ============   ======"
6030 REM
6040 PRINT "1. [RVS]COMMANDS[RVSOFF]  [RVS]A[RVSOFF]SSEMBLE [RVS]D[RVSOFF]ISASSE
MBLE"
6050 PRINT "   [RVS]M[RVSOFF]EMORY [RVS]T[RVSOFF]RANSFER [RVS]C[RVSOFF]ONVERT [R
VS]S[RVSOFF]AVE [RVS]L[RVSOFF]OAD"
6060 PRINT"    [RVS]H[RVSOFF]UNT [RVS]F[RVSOFF]ILL [RVS]G[RVSOFF]O [RVS]I[RVSOFF
]NSTRUCTIONS [RVS]E[RVSOFF]NO":PRINT
6070 PRINT " - ENTER NOS. AS 4 FIG [RVS]HEX[RVSOFF]:$ PREFIX IS"
6080 PRINT "   OPTIONAL (BUT NECESSARY IN ASSEMBLY)"
6090 PRINT
6100 PRINT"2. [RVS]ASSEMBLER[RVSOFF]  ..QUOTES ALLOWS COMMAS!":PRINT
6110 PRINT" - WATCH SPACES : ASSEMBLER USES STRING"
6120 PRINT"   LENGTHS E.G. LOA #$80  STA $8000,X":PRINT
6130 PRINT" - ENTER [RVS]TEXT[RVSOFF] WITH TXT (TEXT) & [RVS]BYTES"
6140 PRINT"   WITH BYT (1 OR MORE 2-DIGIT HEX NO)":PRINT
6150 PRINT" - A HEX NO.(+$) DIRECTS ASSEMBLER TO A"
6160 PRINT"   NEW ADDRESS - USE TO CORRECT ERRORS!":PRINT
6165 PRINT" - USE * FOR RELATIVE BRANCH EG BNE *$FA"
6170 PRINT" - EXIT ASSEMBLER WITH [RVS]END[RVSOFF],[RVS]MEM[RVSOFF] OR [RVS]DISI
RVSOFF]":PRINT
6180 PRINT"     ";:PRINT"[RVS]PRESS ANY KEY FOR NEXT PAGE";
6190 GET Z$:IF Z$=""THEN6190
6200 PRINT:PRINT"[CLR]          INSTRUCTIONS   PAGE 2"
6210 PRINT "          ============   ======":PRINT
6220 PRINT"3. [RVS]DISASSEMBLER[RVSOFF]":PRINT
6230 PRINT" - NB START ADDRESS,[RVS]COMMA[RVSOFF],END ADDRESS":PRINT
6240 PRINT" - EXIT WITH [RVS]SPACE[RVSOFF],[RVS]A[RVSOFF],[RVS]O[RVSOFF] OR [RVS
]M[RVSOFF] ":PRINT
6250 PRINT"4. [RVS]MEMORY[RVSOFF]":PRINT
6260 PRINT" - AS FOR DISASSEMBLER:MEMORY CONTENTS"
6270 PRINT"   ARE GIVEN PLUS [RVS]ASCII[RVSOFF] TO VIEW TEXT":PRINT
6280 PRINT" - NB START ADDRESS,[RVS]COMMA[RVSOFF],END ADDRESS":PRINT
6300 PRINT"5. [RVS]TRANSFER[RVSOFF] ":PRINT
6310 PRINT" - NB START ADDRESS,[RVS]COMMA[RVSOFF],END ADDRESS":PRINT
6320 PRINT" - NEW START ADDRESS WILL BE REQUESTED-"
6330 PRINT"   NEW END ADDRESS GIVEN AFTER TRANSFER":PRINT
6340 PRINT"      [RVS]PRESS ANY KEY FOR NEXT PAGE"
6350 GET Z$:IF Z$=""THEN6350
6400 PRINT"[CLR]          INSTRUCTIONS   PAGE 3"
```

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another way to avoid the null INPUT crash on the Pets. An alternative to using CMD is to use PRINT #/ N,N in which case when N = 3 output goes to the screen and when N = 4 to the printer.

Lines 5000-5250: These DATA lines contain for each 6502 instructions the following three pieces of information: the decimal value of the opcode: the mnemonics for the opcodes themselves: and a code for each opcode to determine the addressing mode.

The disassembly process works by checking the mnemonic which corresponds to a particular value e.g. 169 = $A9 which means LDA (Load the Accumulator with an immediate value) Assembly obviously works the other way round.

Finally, the way in which cursor control characteristics are converted in the listing into meaningful phrases within square brackets is due to the operation of a specialised piece of machine code first published for the Vic, but adapted by the author for the C-64. Versions are published in R West's book *Programming the Pet/CBM* for the Pets also.

Oh Supermon

Although I have a version of Supermon, I use Basicmon about the same amount if Supermon and the code I am writing are competing for the same (top-of-memory) space, or if I wish to undertake many more specialised operations e.g. hex-decimal conversions.

Unlike Extramon/Supermon, this package does not allow the programmer to view the program counter, registers or IRQ location. As these vary in location from machine to machine there seemed to be little point in attempting to implement them in a package designed to be used as widely as possible across a whole range of machines.

The beauty of a Basic assembler/disassembler, provided that it is not abysmally slow in operation, is that it is very easy to adapt to your own particular needs as I have done with the West routine. I am sure that it is quite possible to extend this routine still further if necessary. Given the range of commands associated with this assembler (all of the Supermon and some of the additional Extramon commands) I feel sure that readers will enjoy the facilities that are provided, and that this will compensate for the pain of typing it all in!

The program occupies 11.2K of Basic memory but when running will occupy approx 12.6K. ■

```
6410 PRINT "          ============   ======":PRINT
6420 PRINT"6. [RVS]CONVERT[RVSOFF]":PRINT
6430 PRINT" - A HEX NO.(MUST BE 4-FIG) PRECEDED BY"
6440 PRINT"   '$' WILL BE CONVERTED TO DECIMAL":PRINT
6450 PRINT" - A NO. WITHOUT A '$' PREFIX WILL BE"
6460 PRINT"   ASSUMED DECIMAL AND CONVERTED TO HEX":PRINT
6470 PRINT"7. [RVS]SAVE/LOAD[RVSOFF]":PRINT
6480 PRINT" - OPTIONS ARE GIVEN FOR [RVS]DISK[RVSOFF] OR [RVS]TAPE[RVSOFF]":PRIN
T
6490 PRINT" - [RVS]SAVE[RVSOFF] REQUIRES START/END ADDRESSES":PRINT
6500 PRINT"8. [RVS]HUNT[RVSOFF]  ... MAY BE ABORTED WITH 'X'":PRINT
6510 PRINT" - SPECIFY TEXT WITH '<TEXT> OR BYTES"
6520 PRINT"   SEPARATED BY SPACES E.G.A9 01 A5 A2":PRINT
6530 PRINT"      [RVS]PRESS ANY KEY FOR NEXT PAGE"
6540 GET Z$:IF Z$=""THEN6540
6600 PRINT"[CLR]          INSTRUCTIONS   PAGE 4"
6610 PRINT "          ============   ======":PRINT
6611 PRINT" 9. [RVS]FILL[RVSOFF]":PRINT
6612 PRINT" -  SPECIFY START AND END ADDRESS"
6613 PRINT"    <IN HEX> AND 'FILL' CHARACTER"
6614 PRINT"    <IN HEX> WHEN PROMPTED":PRINT
6620 PRINT"10. [RVS]GO[RVSOFF]":PRINT
6630 PRINT" -  ENTER MACHINE CODE ROUTINE BY"
6640 PRINT"    GIVING ENTRY ADDRESS <IN HEX>":PRINT
6750 PRINT"11. [RVS]END[RVSOFF]":PRINT
6760 PRINT" -  END EXITS THE PROGRAM":PRINT
6770 PRINT" -  YOU MAY [RVS]WARM START[RVSOFF] IN THE EVENT OF"
6780 PRINT"    A CRASH BY 'GOTO 2500'":PRINT:PRINT
6790 PRINT"      [RVS]PRESS ANY KEY TO GIVE MENU[RVSOFF]"
6800 GET Z$:IF Z$=""THEN6800
6810 PRINT CHR$(147):GOTO 2500
READY.
```


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COMMODORE SOFTWARE FILE

Ghostie

Philip Seward from Newbury sends this program for the unexpanded Vic 20

GHOSTIE is similar to the arcade favourite, Pac-Man. You run around a maze gobbling up dots and diamonds. The Ghostie is a pi sign, and you have two minutes to eat as much as you can before the ghostie gets you. Key instructions are included in the program.

Your score is displayed when your time runs out or you are caught.

```
10 PRINT"■":POKE36879,27:REM TITLE AND CREDITS
20 PRINT"■■■■■■■■■■■■ GHOSTIE ■■■■"
30 PRINT"■■■■■■■■■■■■FOR"
40 PRINT"■■■■■■■■■■■THE"
50 PRINT"■■■■■■■■■■VIC20"
60 PRINT"■■■■■■BY PHILIP SEWARD"
70 PRINT"■■■■■■■■■NEWBURY"
80 FORI=1TO2000:NEXTI
85 S1=1:S2=-1:S3=22:S4=-22:RS=160:GH=102:PM=87:D1=46:G1=94
90 TL=200:K1=56:K2=57:K3=58:K4=59:D2=90:CD=30720
100 INPUT"■■■INSTRUCTIONS(Y/N)";A$
110 IFA$="Y"THENGOSUB2000
115 T=0:S=0:P=8064:GOSUB1000
120 G=7680+INT(RND(1)*424)+40:POKE36878,15:DN=36876
125 IFPEEK(G)<>D1THENG=G-1:T=T+1:IFT>5THENG=7734:GOTO125
130 TI$="000000":POKEG,G1:POKEG+CD,0
140 D=INT(RND(1)*4)+1
150 M=PEEK(197)
160 IFD=4THENC=S1
170 IFD=2THENC=S2
180 IFD=3THENC=S3
190 IFD=1THENC=S4
200 IFPEEK(G+C)=RSORPEEK(G+C)=GHTHEN140
205 IFPEEK(G+C)=PMTHENPOKE36879,27:PRINT"■■■THE GHOSTIE GOT
          YOU!!  ■":GOTO2500
210 POKEG,D1:POKEG+CD,4:IFRND(1)<.05THENPOKEG,D2:POKEG+CD,2
215 G=G+C:POKEG,G1:POKEG+CD,0:F=1
220 IFF=1THEN235
230 GOTO200
235 GOTO300
236 IFRND(1)<.25THEN140
240 IFVAL(TI$)>TLTHENPRINT"■■■TIME UP              ■":GOTO3000
250 GOTO200
300 REMYOUR MOVE+SCORE
310 POKEP,PM:POKEP+CD,5
320 M=PEEK(197)
330 IFM=K1THENX=S2
335 IFM=K2THENX=S1
340 IFM=K3THENX=S4
345 IFM=K4THENX=S3
350 IFPEEK(P+X)=RSORPEEK(P+X)=GHTHEN380
355 IFPEEK(P+X)=D1THENS=S+10:Z=1
356 IFPEEK(P+X)=94THENPRINT"■■■THE GHOST GOT YOU!!  ■":GOTO2500
360 IFPEEK(P+X)=D2THENS=S+100:Z=1
365 POKEP,32:P=P+X
370 POKEP,PM:POKEP+CD,5:F=0
375 IFZ=1THENPOKEDN,220:FORI=1TO8:NEXTI:POKEDN,0:Z=0
380 PRINT"■■■■■■■■■■■■
```

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```
1000 REM SET UP MAZE:POKE36879,8
1010 PRINT"■■                              "
1020 PRINT"■ ■■■
```

```
80 A=A+W:B=B+X:C=C+Y:D=D+Z
90 IFA=<0ORA=>1024THEN200
100 IFB=<0ORB=>1024THEN300
110 IFC=<0ORC=>1024THEN400
120 IFD=<0ORD=>1024THEN500
130 DRAW2,A,BTOC,D
140 GOTO80
200 GOSUB5000
210 W=-L
220 IFA=<0THENW=L
230 GOTO80
300 GOSUB5000
310 X=-L
320 IFB=<0THENX=L
330 GOTO80
400 GOSUB5000
410 Y=-L
420 IFC=<0THENY=L
430 GOTO80
500 GOSUB5000
510 Z=-L
520 IFD=<0THENZ=L
530 GOTO80
5000 L=INT(RND(1)*50)+1
5010 S=S+1
5020 IFS=20THENGOSUB5050
5030 RETURN
5050 S=0:SCNCLR
5060 Q=INT(RND(1)*7)+1
5070 REGIONQ
5080 RETURN
```

Colours

Don Horner from Hull sends this program for the Commodore 64

COLOURS makes it possible for you to run quickly through all the possible combinations of background colour and character colour. The program uses the extended background colour mode — set by line 160 — which means that the example characters and their background colours can be changed without affecting the colours of the instruction characters, main background or border.

The panel background colour and character colour can be changed with keys B and C. The appropriate colour codes appear beneath the panel. To move from one colour to another, move the asterisk at the bottom of the screen with <and>, then push B or C. An arrow means that the colour code has been transferred. Push <or> and the asterisk will return. Note that lines 230 and 270 must each have 34 spaces.

```
100 REM ** COLOUR COMBINATIONS **
110 PRINT"■"
115 P=1908
120 POKE53280,0
130 POKE53281,1
140 PRINT"■■■■COMMODORE 64 - AVAILABLE COLOURS"
150 PRINT"■■■■**********************************"
160 POKE53265,PEEK(53265)OR64
170 POKEP,42
180 POKEP+54272,6
200 POKE646,C
210 POKE53283,B
220 PRINT"■■■■■"
230 PRINT"■■■                                  "
240 PRINT"■■■ @ A B C D E F G H I J K L M N O  "
250 PRINT"■■■ P Q R S T U V W X Y Z ← + - £ ↑  "
260 PRINT"■■■    * : ; = , . / ! # $ % & ' (    "
270 PRINT"■■■ ) [ ] < > ? 1 2 3 4 5 6 7 8 9 0  "
280 PRINT"■■■                                  "
290 B$=STR$(B)
295 C$=STR$(C)
300 PRINT"■"
310 PRINT"■■■■BACKGROUND COLOUR NUMBER ="B$" "
320 PRINT"■■■■CHARACTER COLOUR NUMBER  ="C$" "
330 PRINT"■■■■"
340 PRINT"■■■                        1 1 1 1 1 1"
350 PRINT"■■■ 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5"
400 GETA$:IFA$=""THEN400
410 IFA$="B"ORA$="C"THEN500
420 IFA$="."ORA$=","THENZ=1:GOTO440
430 GOTO400
440 IFA$="."THENP=P+2:POKEP-2,32
450 IFA$=","THENP=P-2:POKEP+2,32
460 IFP<1908THENP=1908
470 IFP>1938THENP=1938
480 POKEP,42
485 POKEP+54272,6
```

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```
490 S=(P-1908)/2
495 GOTO400
500 IFA$="B"THENB=B+1
510 IFB=16THENB=0
520 IFA$="B"ANDZ=1THEN580
530 IFA$="B"THEN200
540 IFA$="C"THENC=C+1
550 IFC=16THENC=0
560 IFA$="C"ANDZ=1THEN590
570 IFA$="C"THEN200
580 B=S:POKEP,30:Z=0:GOTO200
590 C=S:POKEP,30:Z=0:GOTO200
600 GOTO400
```

Renumber

Alexander Leslie from Perivale, Middlesex, sends this program for the Commodore 64

THIS USEFUL utility will renumber all Basic statements in routines you have written, so that untidy line numbering will become clear. Load this routine before you begin writing your program, and build up your new program "underneath" it. To call the renumbering routine, use GOTO 32767 or RUN 32767.

The routine will terminate when it has renumbered all your lines as 10, 20, 30 and so on, and finds itself in Basic again. It can then be deleted. Note that the program does not deal with GOTO and GOSUB statements, which still have to be renumbered manually. All occurences of GOTO and GOSUB will be reported on the screen with line references.

```
32767 K=2049:NE=10:PRINT "□" :REM PRINT= CLEAR SCREEN
32770 A%=PEEK(K):B%=PEEK(K+1):C%=PEEK(K+2):D%=PEEK(K+3)
32780 OL=C%+D%*256
32790 IF OL=32767 THEN GOTO 32880
32800 C%=INT(NE/256):D%=INT(NE-C%*256)
32810 POKEK+2,D%:POKE K+3,C%
32820 J=A%+B%*256:K=K+4
32830 FORA=KTOJ:IF PEEK(A) = 137 OR PEEK(A) = 141 THEN GOTO 32850
32840 GOTO 32860
32850 PRINT "("NE"←"OL")";:A=J
32860 NEXTA
32870 K=J:NE=NE+10:GOTO 32770
32880 CLR
32890 END
```

Pools

Rob Morrison of Reading, Berkshire, contributes this program for the unexpanded Vic 20

POOLS CHECK enables pools contestants to determine winning lines. The program is based on a checking list from a major pools company, which chooses twenty numbers. The checking list consists of 56 columns, each consisting of a different combination of these numbers.

The numbers chosen appear on the screen in turn, and the result is entered in the form X for a score draw, O for a no-score draw, A for an away win and H for a home win. When the results have been entered, they are compared with the columns in the checking list. Should a winning line be found, the results pattern is printed on the screen as a secondary check together with the number and profile of the winning column or columns. At the same time the number of winning permutations is computed for each of the dividend categories. These are summarised on the screen when the checking is completed. If no winning line is found, this is also displayed.

```
10 T=0:IFPEEK(41)=4THENT=8
20 H$="■ POOLS CHECK ■":PRINT"□"TAB(4+T)H$
30 LN$="020509141924283235384042444647495052545 5":LN=LEN(LN$)/2
40 PRINT"■ENTER RESULT AGAINST  NUMBER ON COUPON"
50 PRINT"■ X=SCORE O=NO-SCORE    A=AWAY  H=HOME"
60 PRINTTAB(2+T)"■ NUMBER   RESULT■"
70 FORI=1TOLN:N$=MID$(LN$,2*I-1,2):PRINTTAB(4+T)VAL(N$)TAB(12+T);:INPUTQ$
80 P$=P$+Q$:NEXTI
90 PRINT"□"TAB(T)"FINDING WINNING LINES■"
100 FORJ=1TO56:READL$
110 FORI=1TOLN:S$=MID$(L$,I,1):IFS$<>"X"THEN170
120 R$=MID$(P$,I,1)
130 IFR$="X"THENX=X+1
140 IFR$="O"THENO=O+1
150 IFR$="A"THENA=A+1
```

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```
160 IFR$="H"THENH=H+1
170 NEXTI
180 IFX<6OR(X=6ANDO<2)THEN520
190 IFW=0ANDT=0THENPRINT"CHECK:":PRINTP$:PRINT
200 IFW=0ANDT=8THENPRINT"CHECK:"TAB(6)P$:PRINT
210 IFX>6THEN260
220 IFO=4THENW4=W4+6
230 IFO=3THENW4=W4+3
240 IFO=2THENW4=W4+1
250 GOTO500
260 IFX>7THEN380
270 IFO=3THENW2=W2+3:W4=W4+21
280 IFO=2ANDA=1THENW2=W2+2:W3=W3+1:W4=W4+7
290 IFO=2ANDH=1THENW2=W2+2:W4=W4+8
300 IFO=1ANDA=2THENW2=W2+1:W3=W3+2
310 IFO=1ANDA=1THENW2=W2+1:W3=W3+1:W4=W4+1
320 IFO=1ANDH=2THENW2=W2+1:W4=W4+2
330 IFA=3THENW3=W3+3
340 IFO=0ANDA=2THENW3=W3+2:W4=W4+1
350 IFO=0ANDA=1THENW3=W3+1:W4=W4+2
360 IFH=3THENW4=W4+3
370 GOTO500
380 IFX>8THEN460
390 IFO=2THENW1=W1+1:W2=W2+16:W4=W4+28
400 IFO=1ANDA=1THENW1=W1+1:W2=W2+8:W3=W3+8
410 IFO=1ANDH=1THENW1=W1+1:W2=W2+8:W4=W4+8
420 IFA=2THENW1=W1+1:W3=W3+16
430 IFO=0ANDA=1THENW1=W1+1:W3=W3+8:W4=W4+8
440 IFH=2THENW1=W1+1:W4=W4+16
450 GOTO500
460 IFX=10THENW1=W1+45:GOTO500
470 IFO=1THENW1=W1+9:W2=W2+36
480 IFA=1THENW1=W1+9:W3=W3+36
490 IFH=1THENW1=W1+1:W4=W4+36
500 IFT=0THENPRINTJ:PRINTL$:W=1:GOTO520
510 PRINTTAB(1)JTAB(6)L$:W=1
520 X=0:O=0:A=0:H=0:NEXTJ
530 IFW=0THENPRINTTAB(3+T)"■NO WINNING LINE":END
540 PRINT"■"TAB(T)"PTS: 24  23 22.5  22"
550 PRINT"■"TAB(T)" NO:"TAB(2+T)W1TAB(8+T)W2TAB(12+T)W3TAB(17+T)W4:END
560 DATAXXXXXXXXX**********,XXXXXXX*XXXX*X*XXXX,XXXXXXXXXX*X*XXXX
570 DATAXX**XXX*********XXXX,**XXXX*XXXXXXXX*XXXX,*****XXXX*XXXXX**
580 DATA****X*X*XXXXXXXXXXX,**********XXXXXXXXXX,XX**XX**XX**XX**XX
590 DATAXX**XX**XX*****XX**XX,XX**XX****XXXXXXXX*XX,XX**XX****XX**XXXX
600 DATAXX****XXXX**XX*****XX,XX****XXXX*****XXXXX,XX****XX**XXXX**XX
610 DATAXX*****XX**XX**XX**XX,X**X*X*X*X*X*X*X*X*X,X**X*X*X*X*X*X*X*X
620 DATAX*X*X*X***X*XX*X**X*X,X**X*X*X**X*X*X*X*X*X,X*****X*X*X*X*X**X
630 DATAX*X***X*X*X**X*X*X*X,X*X**X*X*X*X*X*X*X*X,X**X**X*X*X*X*X*X*X
640 DATAX**XX**XX**XX**XX**X*X,X**XX*X*X*X*X*X*X*X*X,X**XX**X*X*X*X**X*X*
650 DATAX**XX**X*XX**XX*X**X
660 DATAX***X*XX*X**XX**X*X*X,X***X*X*X**X*X*X*X**X,X***X*XX*X*X*X*X*X**
670 DATAX***XX**XX**X*X*X*X*X,*XX*X*X*XX*X*X**X*XX,**XX*X*X*X**X*X*X*X*
680 DATA*XX*X**X*XX*X*X**X*X*X,*XX*X*X*XX*XX**XX*XX,**XX*XX*X*X**XX*X**
690 DATA*XX**XX*X*X**X*X*X*XX,*XX**XX*X*XX*X**X*XX,**XX*XX*X*X*X*X*X**
700 DATA*X***X*X*X*X*X*X**X*X,*X*XX*X*X*X*X**X*X*X,**X*X*X*X*X*X*X*X*
710 DATA*X**X*X*X*X*X*X*X*X*X,*X*X*X*XX*X*X*X*X*X*,**X*X*X*X*X*X*X*X*
720 DATA*X*X*X*X*X*XX*X*X**X*X,*X*X*X*X*X*X*X*X*XX*,**XX*X*X*XX*X*X*X*
730 DATA**XX*X*X*XX*X*X*X*XX**,**XX*X*X*X*XX*X*XX*X*,**XX*X*X*X*XX*X*XX
740 DATA**X*X*X*XX*X*X*X*X*X*,**X*X*X*X*X*X*X*XX*X*,**XX*X*X*X*XX*X*X*
750 DATA**XX*X*XX*X*XX*X*X**
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Do-it-yourself solution to noise

Is your computer suffering the effects of mains "noise"? If so these tips from ***K Garwell*** *could make your life easier — with a little constructional effort you can beat the buzz for good, and save your programs without frustration*

FROM VARIOUS letters in the popular computing magazines it is evident that there are fellow sufferers from the effects of mains noise. I can well remember that sinking feeling, wondering whether I should get the edit on tape before losing the program. As well as being frustrating, noise can cause very mysterious occurences. In my own case, one favourite was that whatever command one typed produced "sn error", whilst on other occasions @ signs seemed to be the in thing. Before going on to show how the effects of mains noise can be isolated, a word or two to consider just what it is.

I use the word "noise" generally, and perhaps a bit loosely, to mean either short disconnections of the supply, or high frequencies introduced into the mains supply by switching on other equipment, particularly motors. The high frequency noise can travel some distance along mains cables and is not necessarily generated in one's own home.

Short breaks in the mains supply are noticeable if the lights are on, and occasionally such short breaks will cause the TV picture to break up or even disappear momentarily. Most micros are very resilient to breaks of this sort. I have never had any trouble from this although my lights do blink occasionally.

The effects that do cause trouble, and to which many machines are susceptible, are the high frequency components that occasionally appear. These components may be present on either the live or neutral lines or both.

There are two principle solutions to the problem, one of course noticeably cheaper than the other. However neither solution is so expensive that one needs to continue the frustration of lost programs. As I said earlier I was in the situation at one time that I could not be certain of completing an edit before losing the program. Now that situation has completely changed. It works perfectly and I only save really complicated edits before testing.

The first solution to the problem is a simple filter, such as shown in Fig. 1. This consists of two inductors, L1 and L2, which are in series with the live and neutral from the mains. On the equipment side one capacitor, C3, is connected between live and neutral and two others C1 and C2 are connected from live and neutral respectively down to earth. This configuration is very effective and is the one most commonly used for a wide variety of equipment which either generates interference or is susceptible to it. To simplify the way in which it works one may imagine the inductors as offering a barrier to the noise whilst the capacitors bypass any remaining noise to the earth line.

The first solution to the problem is a simple filter, such as shown in Fig. 1. This consists of two inductors, L1 and L2, which are in series with the live and neutral from the mains. On the equipment side one capacitor, C3, is connected between live and neutral and two others C1 and C2 are connected from live and neutral respectively down to earth. This configuration is very effective, and is the one most commonly used for a wide variety of equipment which either generates interference or is susceptible to it. ▶

Figure 1

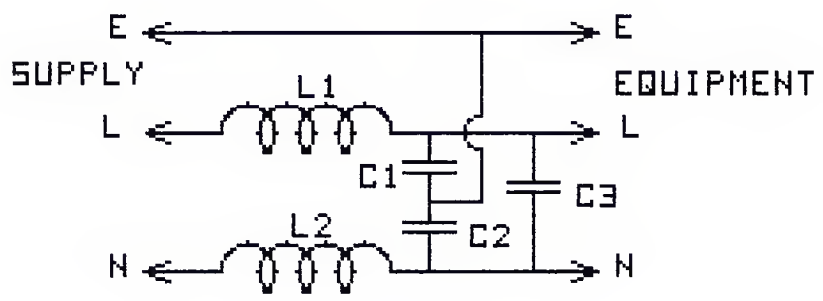
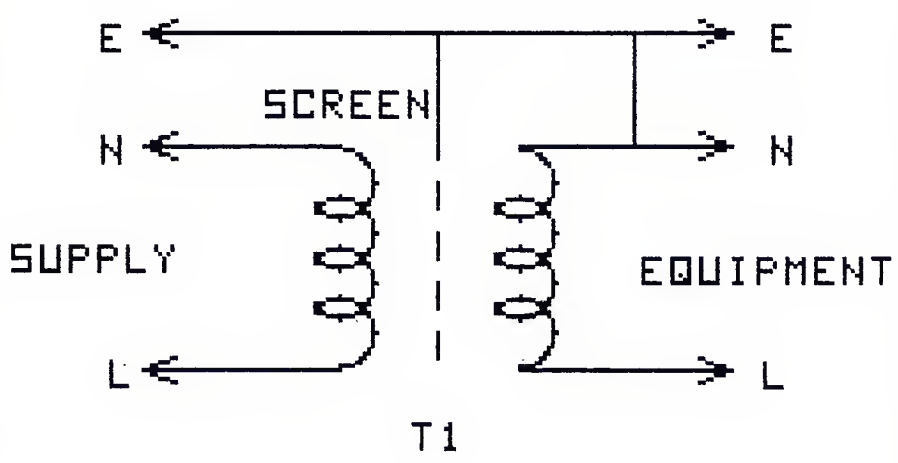


Figure 2



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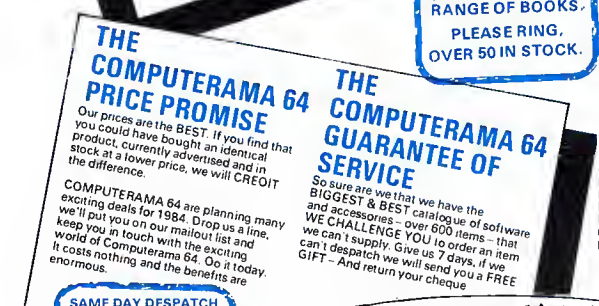

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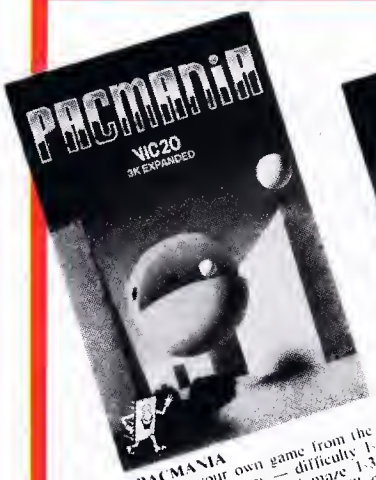

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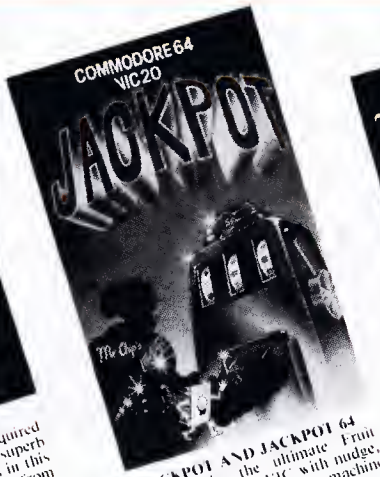

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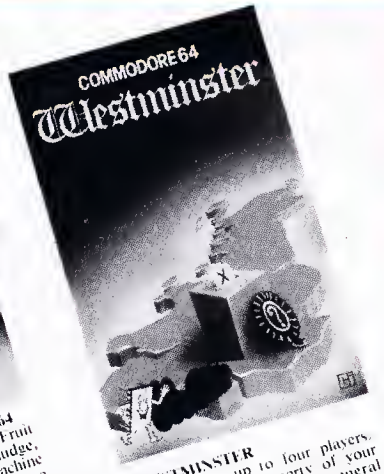

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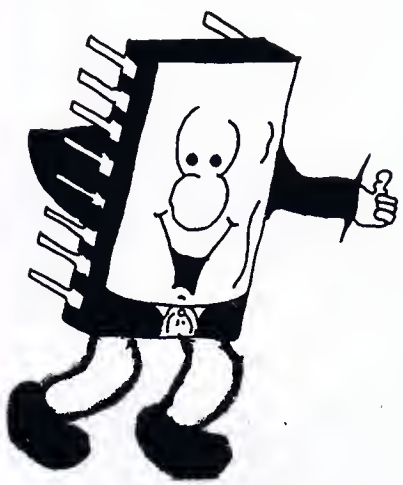

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◀ To simplify the way it works one may imagine the inductors as offering a barrier to the noise whilst the capacitors bypass any remaining noise to the earth line.

The second solution, which is more expensive and correspondingly more effective, is an isolating transformer as shown in Fig 2. T1 indicates the transformer, the primary of which is connected to the supply and the secondary to the equipment. A screen between the two windings further enhances the isolation. A toroidal transformer is most convenient because of its small size and low losses. This arrangement is very effective and indeed is the one I use.

Having discussed the two schemes we now come to the construction. This is quite straightforward for either and the components are readily available.

To consider the construction of a filter unit first. Fig. 3 shows a constructional diagram. The capacitors C1, C2, C3 are in fact encapsulated into one small module with three wires coming out, two coloured black (BK) and one coloured green/yellow (GY). The two inductors are also encapsulated, the module having four wires, two black and two blue (BE).

I constructed a unit from a standard double surface mounting box with two 13 amp sockets. These are available from electrical shops and many of the chain stores. The two modules are small enough to fit into the space behind the sockets. A length of 3 core mains cable (5 or 6 amp) with a suitable plug completes the unit. The connections between this and the blue leads from the inductor module can be made by means of a small screw connector if one does not have access to a soldering iron. The connections are all shown in Fig 3. It is important that the two black wires are connected to the socket and the two blue ones to the mains supply via the cable and plug.

Difficulty

The chief difficulty is getting the live and neutral connections the right way round because they are not distinguished on the inductor module. Some form of simple continuity test is required to find out which of the blue wires is connected to which of the socket connections. This is most easily done with a multimeter or lamp and battery.

I have suggested using a ready made box, but this has the disadvantage of having only two sockets. A few words about plugs sockets and boxes later on. The inductor unit will handle up to 4 amps, which will be sufficient for the equipment. The plug for the supply should be fused at 3 amps.

The second arrangement is just as easy to build, the only problem being that the transformer is too large to go into anything like the surface mounting box that I suggested for the filter unit. A piece of hardboard and a few minutes carpentry will solve this problem however. It does also mean that the box can be made big enough to accommodate more than two sockets. Standard 13 amp sockets can be used. Fig 4 shows the wiring. The two connections to the supply being coloured orange (OR) and the two connections to the socket being red (RD). There is no right and wrong way round for the wires this time so long as the orange wires go to the supply and the red to the socket. Again, a small screw connector may be useful for connecting the transformer wires to the mains cable. Connections to other sockets are indicated by the arrows. Yes, the drawing is correct — the neutral and earth connections of the socket are connected together. Fit a 3 amp fuse in the supply plug for this arrangement also.

The transformer is rated at 80va which is usually sufficient for the micro, a small black and white TV, a tape recorder and printer. However if one is using a large colour TV then it should be run direct from the mains supply, preferably from the same point that the transformer unit is plugged into. Use a two way adaptor if necessary.

As an alternative to 13 amp sockets, which are rather large, 6 amp sockets are available which are about one and a quarter inches square. They make a neater job altogether, but remember plugs will be required as well. The sockets clip into a rectangular hole.

So which to use, the filter or the transformer? The best answer I can give is that if you have only an occasional problem, then the filter should be sufficient. Otherwise go for the transformer.

Figure 3

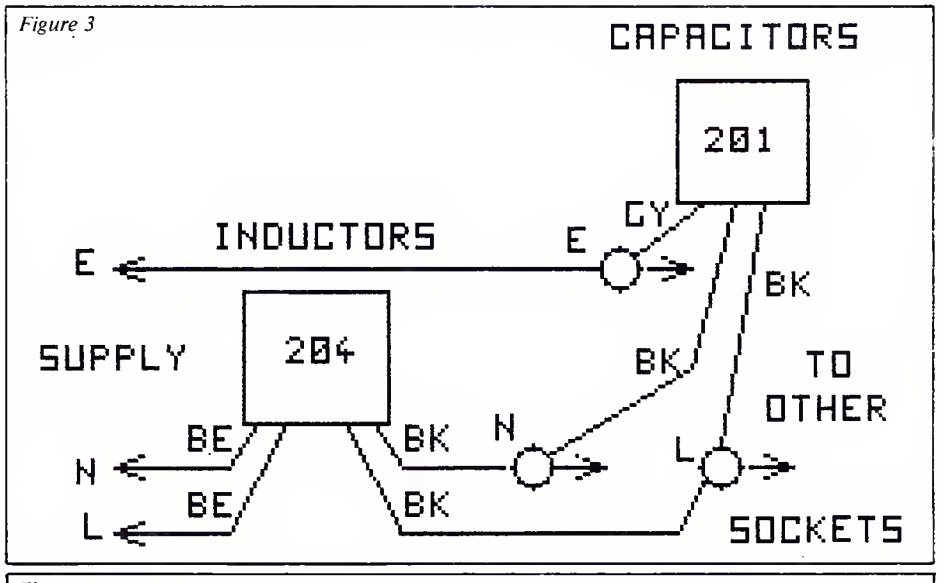
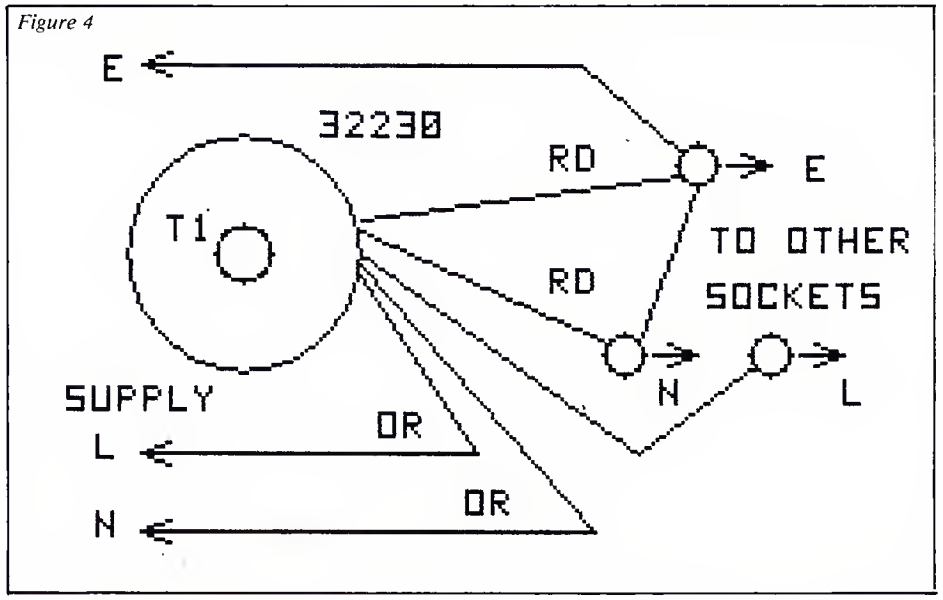


Figure 4



Suppliers

Here's a selection of suggested suppliers, along with catalogue numbers and approximate prices. Contact them for further details.

The filter items and small plugs and sockets may be obtained from MS Components Ltd, Zephyr House, Waring Street, West Norwood, London, SE27 9LH. cat no. 201, suppressor: £0.61; cat no. 204, suppressor: £1.79; cat no. 1065, socket: £0.89; and cat no. 1066, plug: £1.26.

A plastic box large enough for the transformer and four of the 6 amp sockets (which it will have to be cut to fit) is — cat no. 4069, grey plastic box, 190×110×60mm; £1.94.

For the transformer, try ILP Electronics Ltd, Graham Bell House, Roper Close, Canterbury, Kent, CT2 7EP.

Transformer; part no. 32230, cost £8.46.

Check prices and availability of the components with the suppliers before sending money. ■

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Joining the contest

ON THE FACE of it, little has changed recently in Commodore's world. Last year's apparent suicide pact among home computer makers, which had many cutting first prices and then their own throats, has now taken Timex as well as Texas Instruments and Mattel out of a market where some survivors are still convalescing from financial wounds.

Losing rivals in this way will no doubt please Commodore, whose remaining competitors, like Atari and Coleco, are financially far from strong. Better still for Commodore, the downward pressure on prices seem to have ceased while demand for home computers — which pundits think will create a 2.8 billion dollar market in 1984 — is still rising.

But recent events suggest that chairman Irving Gould and new chief executive Marshall Smith have only half their attention focused on the home computer sector.

Commodore has signed licensing agreements with both Bytec-Comtern, makers of the Hyperion IBM look-alike portable computer, and with chip manufacturer Intel, which makes Commodore's own entry into the market for IBM-compatible office machines look ever more likely.

Bytec-Comtern appear to be a useful partner. Montreal-based Comtern and Bytec Management merged last October to create a group with sales of around 100 million dollars in the top five league of Canadian hi-tech companies after Northern Telecom, Marconi and Mitel.

The deal with Bytec-Comtern is that a Commodore offshoot, Commodore Electronics, will develop, make and market computers based on Hyperion technology.

Comments on the present Hyperion IBM-look alike are mixed. Some critics are very impressed with the 256K Hyperion's compact size, capacity as compared to the basic 64K PC, the fact that it is available at all in the UK, and its versatile operating system. Another critic called it "little more than an executive toy", but then he did write for IBM PC User.

Much more important though from Commodore's point of view are the present trends in the portable computer market. IBM's determination to extend its mainframe dominance into personal computers is reflected in a 20% UK price cut aimed at ACT which is hardly demand-related — if anything, IBM is struggling to meet demand.

It's no different with portables. In mid-February, IBM launched its own portable which instantly hammered the share prices of rivals like Eagle and Compaq, even though component shortages mean many IBM dealers will only get "three per store per month for some time".

Commodore will produce the 8088 chip used in the IBM PC and IBM compatibles apparently "for its own use", which points to an early debut for a Commodore IBM look-alike. However, with Intel chips in short supply, the attraction of becoming a second source for hungry manufacturers will not be lost on Commodore — it if can be arranged.

IBM is talking hard to Intel itself, and has much greater bargaining power than Commodore — IBM holds roughly 20% of Intel's shares.

Commodore would appear to have pre-empted problems but they would do well to tread carefully in the portable market. America has a love affair with IBM, apparently blind to quality, and while Commodore may proudly sit on top of the home computer pile with their one billion dollar sales, they should not forget that IBM is thirty-five times the size — and quite capable of inflicting heavy losses on Commodore.

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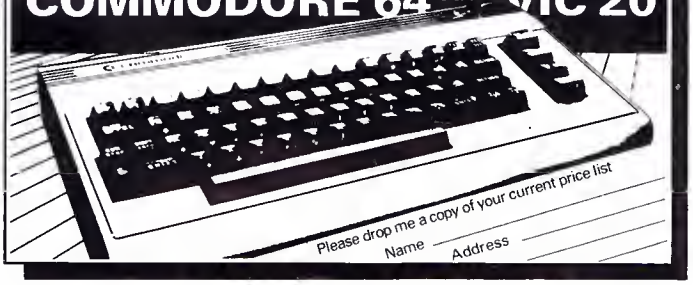

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ANSWER BACK

Machine monitor

I AM TRANSFERRING all my programs to disk, but am not sure how to go about transferring machine code programs. Can you help?
T E Davies
Pontypridd
Mid Glamorgan

YOU CAN USE a machine code monitor program to transfer machine code programs from tape to disk, but it will not transfer protected programs since their code is usually tape specific.

In the monitor, enter
.L "PRG NAME",01

The start address of your program will be at $033d (low byte) and $033e (low byte), and the end address at $033f (lb) and $0340 (hb). You then enter
.S "PRG NAME",08, start address, end address + 1, and repeat for each program.

Research work

I USE A CBM 8096 and 8050 dual-drive system, with a Ricoh Flowriter printer in my work, mainly for word processing using Wordcraft 80. Since I'll be using the system in research work, I want to set up a parallel system to continue word processing.

Is there a cheap, viable system based on CBM equipment? I know the screen format of the 64 is half that of the 8096. I also want to use the main system for database work.
Dr Gordon Claridge
Magdalen College
Oxford

SUPEROFFICE 8096, by Precision Software, would be one solution. It includes Superbase for your database work, Superscript 2 for word processing, plus a user expandable spelling checker.

It has the ability to create printer definition files (fully explained in the manual), which can be read by the Easyscript 64 program available from CBM. The database can be read by CBM's Superbase 64, so long as the CBM 64 screen format is changed to 40 columns.

To sum up, you would need a CBM 64 (£229), a CBM 1541 disk drive (£229), Superoffice 8096 (£799), Superbase 64 (£99), Easyscript (£75), and Easyspell (£50) — total round £1,500.

From printer . . .

I'M NOT SATISFIED with the performance of my Vic 1515 printer, and want to replace it with a new dot matrix printer of better specification.

My minimum requirements are print speed of at least 80 cps, type face with true descenders, print width of 12 cpi, able to accept paper up to 10 inches wide, capable of printing well on two-ply stationery, and with a manual control knob to turn the paper backwards and forwards. What could you recommend, and what interface would be needed?
John W Dunster
Chigwell
Essex

THE EPSON RX80FT will fit the bill, and can be used with the Vicsprint interface available at around £45 from Ram Electronics, 106 Fleet Road, Fleet, Hants, phone 02514 5858. Check with them if it will run with the software you wish to use.

. . . to printer

I HAVE A Vic 20, and have been offered a Seikosha GP100 printer. Will this printer run on the Vic 20? If so can leads be purchased? Or would it be expensive to convert the printer?
F P Weeks
Portishead
Avon

THE GP100 printer can be bought from Seikosha complete with a Vic compatible interface. Therefore you should contact Seikosha's distributors to check if the interface on the printer you have been offered is of the correct type.

If not they will be able to quote prices for changing the interface. Contact DRG Business Systems, 13-14 Lynx Crescent, Winterstoke Road, Weston-super-Mare, Avon; phone 0934 419914.

Keeping Pets

AS YOU KNOW the Pet 4016 has limited graphics capabilities and, because of the market it was aimed it, little games software. Are there any means of upgrading the graphics?

Where can I obtain a list of educational games intended for Commodore machines and compatible with the Pet? And what would be the best source of software?
G Patel
Wood Green
London

YOU COULD TRY fitting a high-resolution board, obtainable from Supersoft at Winchester House, Canning Road, Wealdstone, Harrow, Middlesex (01-861 1166). For software, join ICPUG (see the article in February's issue).

ICPUG has a free software library of public domain programs for all versions of the Pet, and also for the Vic 20 and 64. You pay postage and packing, and supply the cassettes or disks.

Multiperplexity

THE *Vic Programmer's Reference Guide* mentions multiplexing equipment, which allows the Vic picture to be blended with a picture from another source. Could you give me some information about multiplexing equipment, as regards costs, where to purchase and how to use it?
S Gaskell
Wigan
Lancashire

FIRST A FEW words about multiplexing. A TV picture is not built up, as many people believe, of 625 lines created in order from the top to the bottom of the screen.

The picture consists of two halves, of 312 lines each. Lines 1, 3 and 5 are scanned, then 2, 4 and 6, and so on. This is called interlacing, and if you blend a Vic picture with another in this way you lose half the definition.

I would think therefore that although it can be done, it is not a practical proposition. If anyone knows of practical multiplexing equipment, and can quote suppliers and cost, please let me know.

Monitor machine

I RECENTLY managed to get hold of the monitor from a table-top style arcade game. My problem is that the input to the monitor is RGB, but my 64 has only a composite output. What's the best and cheapest way around this problem?
Barry Nightingale
St Mary Cray
Kent

UNFORTUNATELY the video circuitry within the 64 only generates composite video, and RGB does not exist separately.

You can, however, use an external separator to split composite into RGB, and this should solve your problem. A large specialist video or computer store should be able to help.

Games advice

I'VE HAD my Vic 20 for a little while, and now I want to start to learn how to program my own games. The problem is I haven't any idea how to go about it.

Could you advise me on any books I could buy?
Jane Allen
Kensington
London

I SUGGEST you buy the *Programmer's Reference Guide* for the Vic 20, available from Commodore or large computer shops, as are the useful *Introduction to Basic* parts 1 and 2.

The way most people find out how to create programs is by examining published programs and experimenting with them to see the results of changing parts of the program.

If you need help with a technical query or problem write to Jack Cohen, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD

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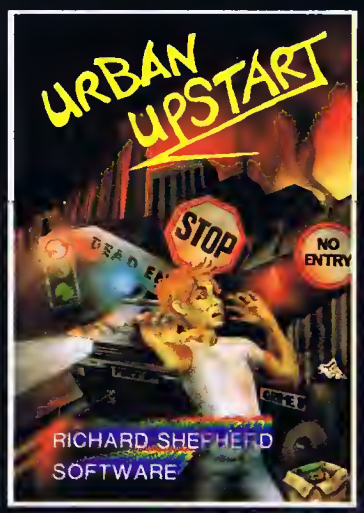

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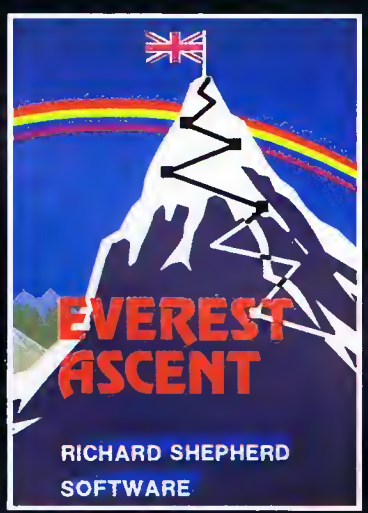

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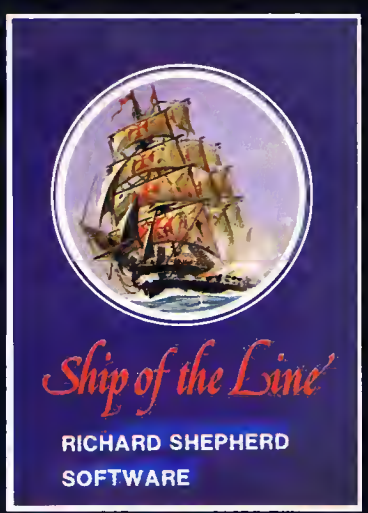

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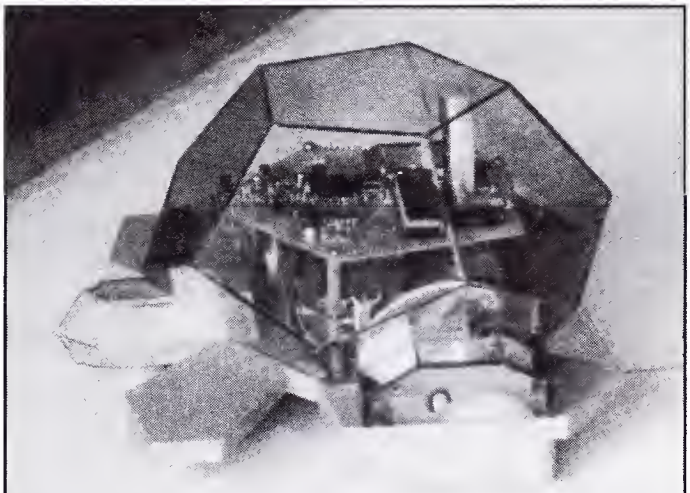


The chance to win a turtle of your very own

***Tony Roberts** tests your skill — Valiant Designs and Commodore present the prize.*

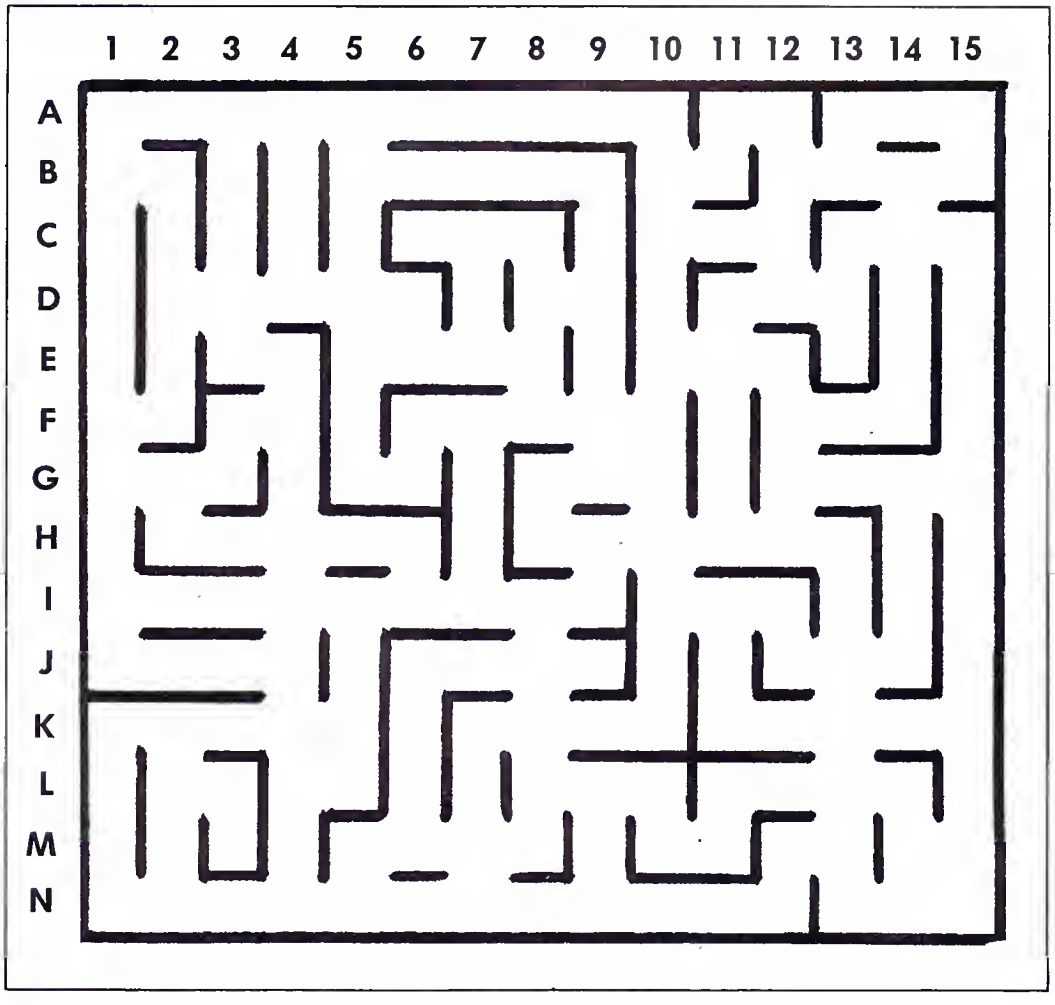
Send your answers to Competition Corner, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD — to arrive no later than the last working day in the month on the cover of this issue. The name of the winner, and the solution to the puzzle, will be published in the issue after next. Entries will not be acknowledged and we cannot enter into correspondence on the result

THE HELL Nook Micro Club has decided to enter for this year's Micro Mouse competition, to make a micro on wheels which will run around a maze, hunting for a target square.

Desidera has made a "mouse" called Charlie, and Ermentrude has programmed it — pretty simply at first. All Charlie did was roll forward from one of the corner starting squares for a fixed distance, turn left or right (randomly on the first corner, thereafter alternately), roll forward the same fixed distance, and so on.

Strangely, when they tried out the mouse on their test maze, it reached the target square after the same number of turns, whichever corner starting square it began from.

If Charlie hits a wall, all he does is stop, wheels skidding, until it's time to turn left or right again.



Now the beermat marking the target square has fallen off — can you work out where the target square is?

Simply give the number/letter code for the target square and complete the tiebreaker sentence in an apt, amusing and original manner in 15 words or less.

This month's prize is Valiant Designs' remote controlled turtle — and the tiebreaker is "I want to own a Valiant turtle because . . ."

To start you thinking on the tiebreaker consider the advantages of having a robot of your own to control or send out exploring.

The turtle runs on any hard flat surface such as a table top or floor (including some carpets, depending on their pile). And it is remote controlled via an infra red system over a distance of more than eight metres.

While the turtle is out on its explorations you can set it to drawing beautiful multi-coloured patterns. You can vary the colours and line widths on these drawings by simply changing the pen the turtle is using — and this can be done from the outside without opening the shell.

Aside from being a valuable educational tool (for learning about maths as well as computers), the turtle is ideal for encouraging children's imaginations. It's even been known to persuade the most computer-shy of adults to start playing with th keyboard. And to add to th turtle's power Commodore i providing its Logo language as part of the prize.

The turtle comes as part o a complete package including the remote control communi cator which is linked to y 64, a recharger, a manual a the first part of what Valia intends to become a encyclopedia of turtle knowledge.

The winner of our Marc competition is Reginald Mascall of Thornbury, whose prize is a Microsound 64 keyboard from Auto-graphics.

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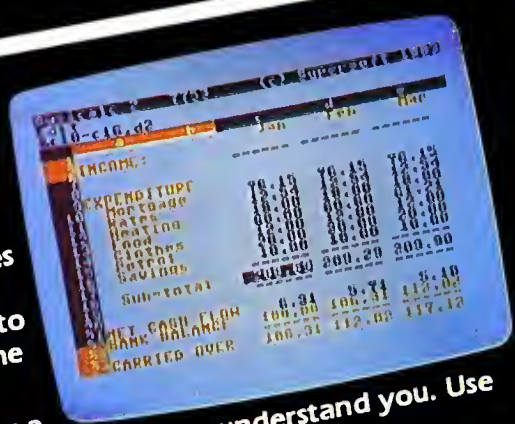

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